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ROCK PRODUCTS

CEMENT · SAND AND GRAVEL · CRUSHED STONE · SLAG · LIME · GYPSUM
READY-MIXED CONCRETE · CONCRETE PRODUCTS · INDUSTRIAL MINERALS

IN THIS ISSUE

Build Modern Silica Plant
Stockpiling With Ballast Car Spreaders Promote Agstone Sales
Sell Concrete On Strength Basis
Concrete-Steel Pressure Pipe

BELOW: Dredging raw material at new silica plant of George F. Pettinos, Inc., which may be seen in the background

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{80 TON SWITCHER}

Another Important Porter Development!

A brand new idea in hood construction and door arrangement provides easy access to engines through full double-door openings. The frameless hood is constructed entirely of formed sheets, thus eliminating angles and stanchions, and affording unobstructed access to power plants. Service men can work on one of the two independent power units while the locomotive is operating on the other, thus adding to its availability. Full description on request.

ARMY (E) NAVY

PORTER "Better Built" Equipment

Established 1866

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Diesel, Diesel-Electric, Electric, Steam, and Fireless Steam Locomotives.

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Agitators, Mixers, Blenders, Autoclaves Kettles, Pressure Vessels, Driers, Ball and Pebble Mills.

QUIMBY PUMP DIVISION:
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FACTORIES:

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Under-water mud slinger

A typical example of B. F. Goodrich development in rubber

THAT'S a "cutter head". It will soon be at the bottom of a river; its round blades will turn, and chew up mud. Hose will suck the mud up through a pipe, and so keep rivers and harbors deep enough for shipping. But the shaft that turns this 2-ton mass of metal is under water and so the bearing can't be lubricated by anything but the muddy water churned up by the dredge. This gritty mud gets between shaft and bearing, and cuts up even the hardest metal in a few hours.

B. F. Goodrich engineers heard of this mud dredge problem. They had developed a rubber bearing for propeller shafts of ships. Rubber is slippery when wet, and the bearing is perfectly lubricated by water. The rubber is about as soft as a tire tread and resists wear from small grit particles just as a tire does. They tried it in dredges and it lasted ten times as long as former bearings in the severest kind of service.

B. F. Goodrich Cutless rubber bearings are being used today not only on dredges and river boats but on warships, from the biggest battleships down to small craft of all kinds. In landing boats they have made it possible to go on operating even when propellers and shafts have been bent or damaged. So they're making our navy more efficient, saving cost and repair time, and they'll make similar savings for all ship operators after the war.

Savings in cost and better performance of products are typical results for industry from scores of B. F. Goodrich developments. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

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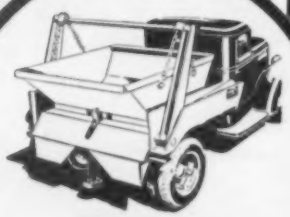

For POST-WAR ECONOMIES!

Prepare to cut costs in hand loading jobs by using Load Luggers mounted on your trucks. This efficient method saves manpower and speeds up

QUARRY OPERATIONS
LOADING RIPRAP
FEEDING CRUSHERS
STRIPPING OVERBURDEN

For details, see Catalog No. 44 and also ask about the new TrucKrane Boom Attachment for the Load Lugger.

FOR MAXIMUM TRUCK EFFICIENCY

Use 5 to 10 detachable dump buckets with each Load Lugger.

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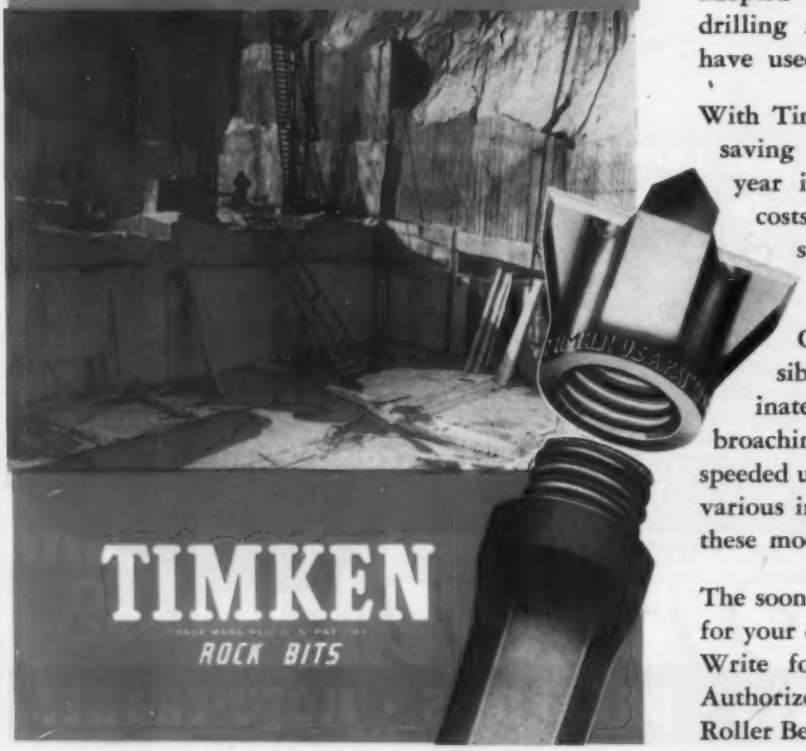
PIRIE GRANITE QUARRIES SAVE WITH TIMKEN ROCK BITS

Views in the Pirie Granite Quarries. Photographs by Fred F. Pirie.



The granite quarries operated by J. K. Pirie Estate, Barre, Vermont, are among the oldest in the country. They were founded in 1882 by James Kelman Pirie and George Lamson.

Two sons of the founder, James G. Pirie and Fred F. Pirie, are the present managers.

Always alert and receptive to progressive ideas, these experienced quarriers adopted Timken Rock Bits for their drilling more than six years ago and have used them exclusively ever since.

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Pneumatic Feed Control to maintain maximum "load" on mill.

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Their dependability has been proved by years of steady performance in the leading plants of the industry.

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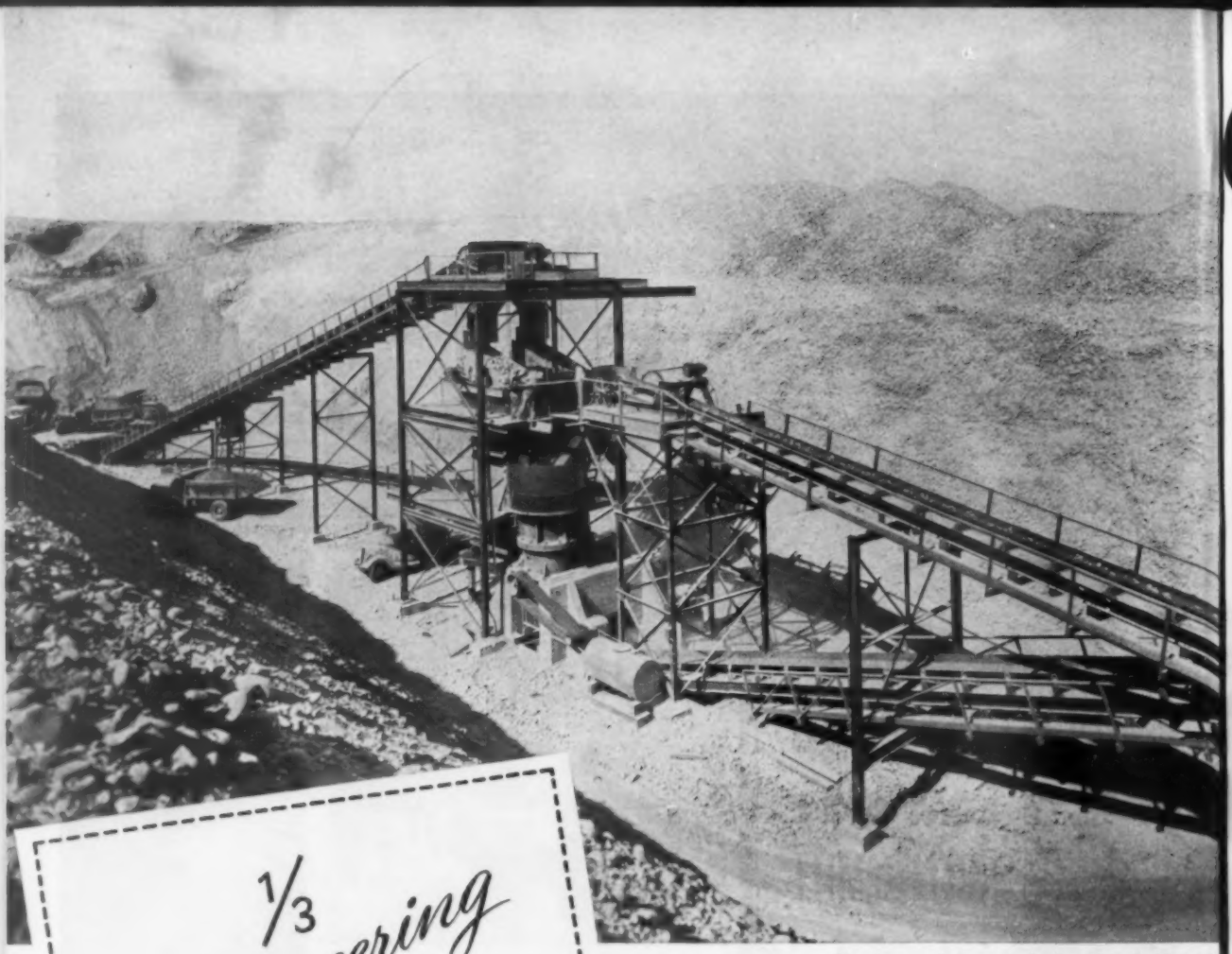

Here is a gravel plant completely equipped with S-A b conveyors, plate feeders and vibrating screens. Varie sizes of rock and sand are produced at this efficient pla

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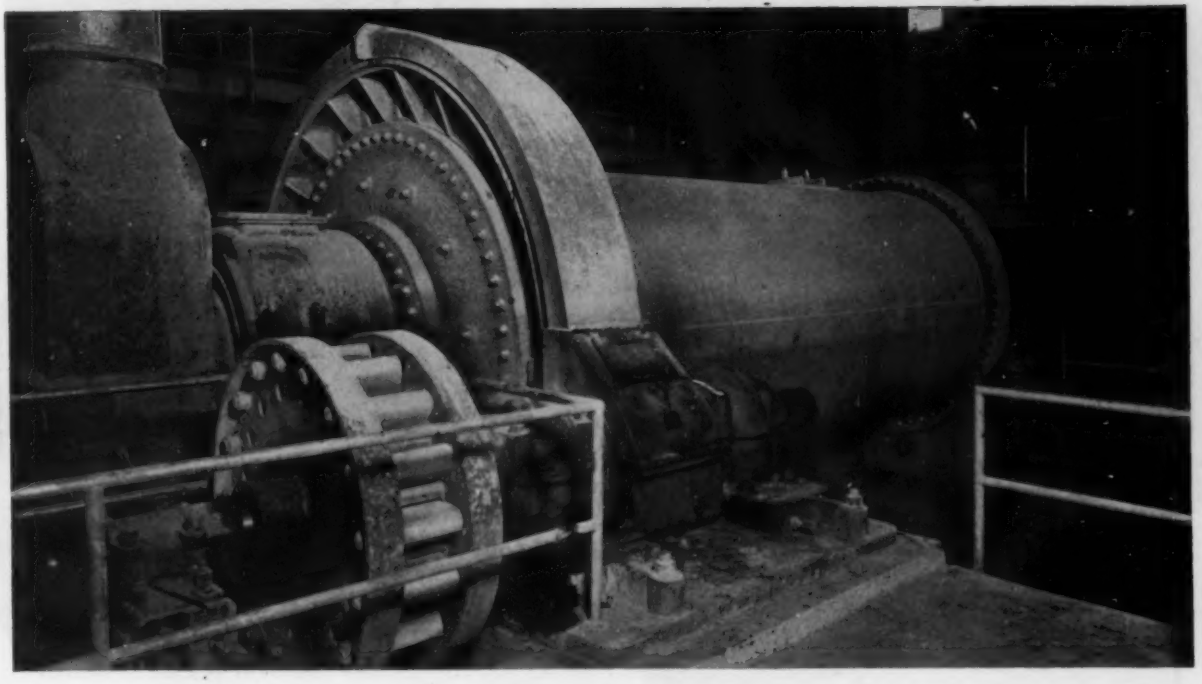
Designers and Manufacturers of All Types of
BULK MATERIAL HANDLING EQUIPMENT

Compartment Mills



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The combination makes certain that the output always meets predetermined requirements and that the unit cost of production is the lowest attainable with this type of equipment.

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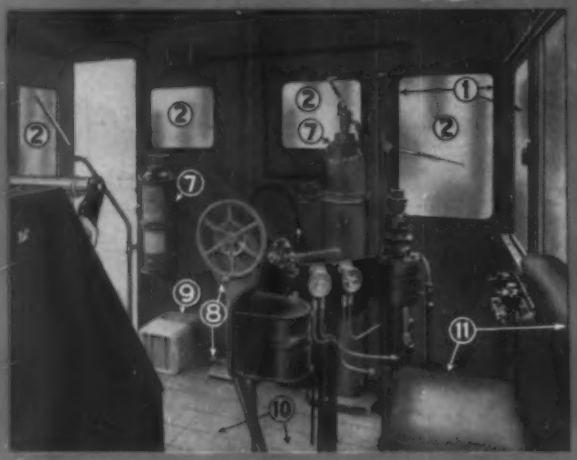
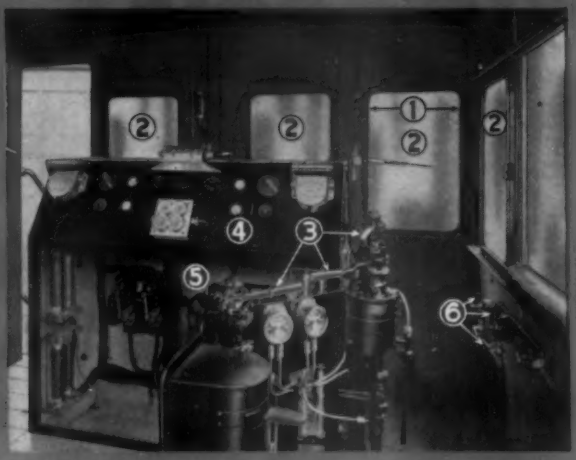


Left side of cab showing controls for running backward



Right side of cab showing controls for running forward

WHEN a great steel company wanted a 70-ton Diesel-Electric Switcher with every approved facility for safe convenient operation, Vulcan met their rigid specifications successfully with the 400 hp. standard gauge locomotive illustrated above. Equipped with two complete power plants and four high-speed traction motors, it has a continuous tractive capacity (at 5.1 miles per hour) of 17,900 lbs. and can be operated safely with lighter loads at speeds up to 25 miles per hour. The roomy cab, equipped with pneumatic dual control for operation with equal safety and convenience from either side, affords the following additional advantages:

1. Full-Vision, without sacrificing strength and rigidity of construction.
2. Clear-Vision, Shatter-Proof Glass in steel sash, mounted in Everseal glazing cushion—thereby protecting the glass against breakage and making it water-tight.
3. Controls conveniently grouped and located within arms reach when operator is looking out of side window on either side of cab.
4. Auxiliary Switches and Gauges neatly grouped on slanting dashboard—illuminated, without glare, for night operation.
5. Contactors, Relays, Switches, Resistors, etc., mounted in cabinet inside of cab—easily accessible through removable doors.
6. Window Wipers, Sanders and Bell operated by compressed air; with valves located conveniently for operator.
7. Ample Protection from Fire by both built-in and portable fire extinguishers.
8. Powerful Parking Brake—rachet-wheel type with quick release.
9. Motor-Driven Heating Units, utilizing hot water from main-engine jackets.
10. Ample Working Space around all parts.
11. Comfortable Padded Seats and Arm-Rests for operator, on both sides.

Write us regarding any present or prospective haulage requirement. Vulcan makes all types of industrial locomotives—Steam, Diesel, Gasoline, Electric or Diesel-Electric—from six to 100 tons in weight; wide or narrow gauge—and Vulcan Engineers are always ready to cooperate with purchasers in working out any necessary special features.

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Armored with RAYOTWIST CORD for still greater strength!

HEAVY-DUTY FEATURES of the Goodyear HARD ROCK LUG TIRE

1 Massive lug-bar tread

2 Extra-thick undertread

3 Tread-armored sidewalls

4 Super-strong Rayotwist cord carcass

LONG the sturdiest rock tire built, Goodyear's great Hard Rock Lug tire is tougher than ever today. That's because it is now built with Rayotwist cord.— Goodyear's patented rayon cord — *the strongest cord ever used in a work tire.* Now, it's doubly armored for more ton-miles' service over the hardest going.

Years of experience have already proved that the massive, wide-based lug bar tread is the surest-footed, most bruise-proof for rock work. And note how those heavy lugs extend deep down over the sidewalls — additional armor against cutting and snagging.

Goodyear design makes the Hard Rock Lug tread one that is universal, two-way, with no rights, with no lefts. That means you can count on the same powerful grip in reverse that you get forward. The straight, wide, V-shaped grooves are open at the ends and at the right angle to force out dirt and stones as the wheel revolves.

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BUY WAR BONDS — BUY FOR KEEPS

THERE'S A GOODYEAR FOR EVERY JOB

For traction in soft going specify **Goodyear Sure-Grip**

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THE GREATEST NAME IN RUBBER

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

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precedes progress

ARMY (E) NAVY

P

roduction of Flour Mills in the 18th century was limited to the local power available.

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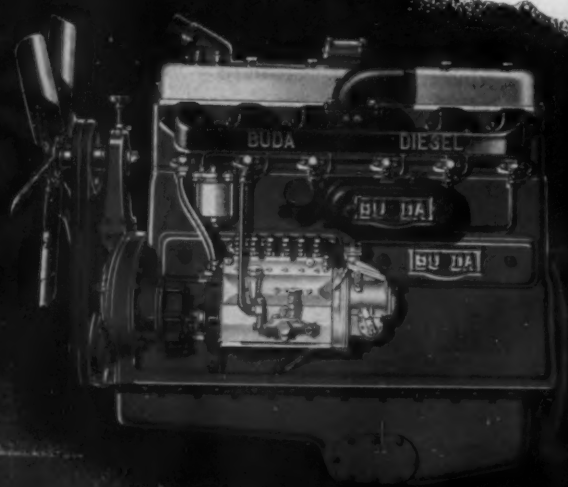
Flour Mill — 16th Century



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BUDA

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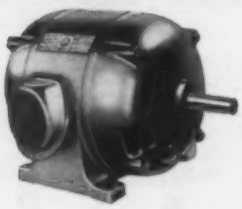
To push that much water around takes plenty of power, and this specially designed Westinghouse motor delivers the 350 hp punch necessary to do the job.

You'll probably never need a motor to "push a river"—but the same kind of engineering skill that goes into such specialized motor jobs is back of every Westinghouse motor you buy.

This ready-to-use experience is available to you for wartime needs—or in planning for postwar conversion. It can help you solve any drive problem quickly—with a motor exactly fitted to the job. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

J-21300



Westinghouse motors

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

This is only one of the many Westinghouse general-purpose motors available in standard and special enclosures. Features include choice of sealed-sleeve or ball bearings; Tuffernell insulation; dynamically balanced rotor; rigid one-piece frame; die-cast rotor; radio-frequency tested insulation.

• These easy-to-handle, rugged machines can be found on battle fronts all over the globe. Construction battalions everywhere are using them to build landing strips, lay road beds and perform the dozens of other tasks that must be done in order to secure captured territories for further attack on the enemy!

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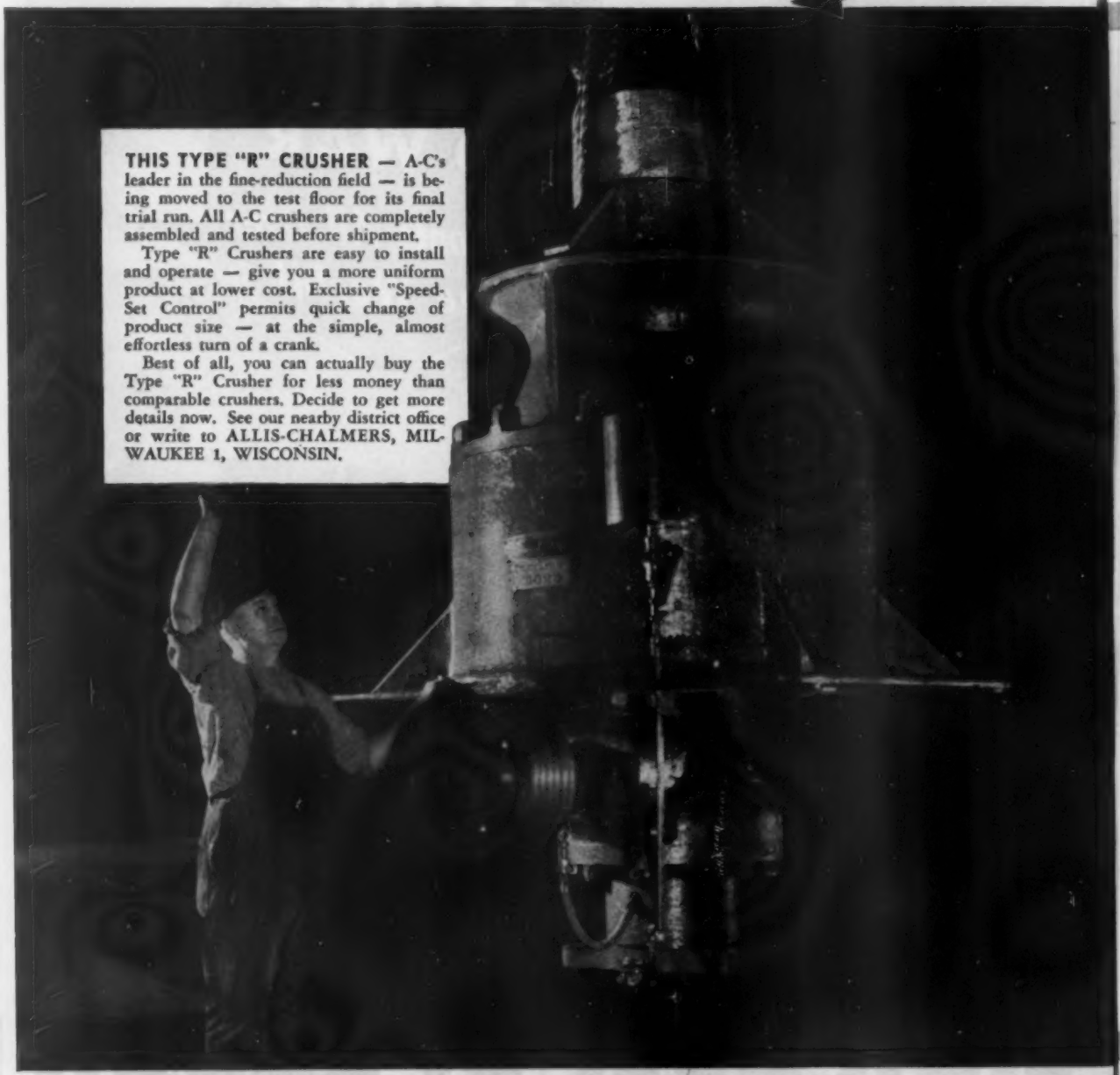

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Type "R" Crushers are easy to install and operate — give you a more uniform product at lower cost. Exclusive "Speed-Set Control" permits quick change of product size — at the simple, almost effortless turn of a crank.

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..You Get This!

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3 UNBIASED RECOMMENDATION

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A 1722 A

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The EUCLID ROAD MACHINERY Co. · · · Cleveland 17, Ohio

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Which of these 5

GATES V-Belts

Best Fits *YOUR* Needs?

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Phone Him TODAY!

Whenever a drive in your plant gives you the slightest trouble, it is a good plan to phone the Gates Rubber Engineer. He is a specialist who makes a business of improving drive operation.

For example, you may have a drive that appears to be wearing out belts faster than it should. In most cases the Gates Rubber Engineer can correct the difficulty quite easily and will find no need for you to adopt belts of any special construction.

At times, however, he will find conditions under which a V-Belt of special structure can most profitably be used—and he can then supply a Gates V-Belt that is precisely engineered to meet the unusual conditions.

The Gates V-Belt of special synthetic rubber is a case in point. For more than 6 years now, Gates has been supplying industry with many thousands of these belts. Under severe conditions of heat and oil, the Gates special synthetic belt actually outwears any natural rubber belt by as much 230%.

In your particular application, V-Belts with tension members composed of flexible steel cables—or of rayon cords—may prove to be the most efficient and economical. Again, Static-Safety V-Belts may best fit your special need.

In any case, the wisest move you can make is to phone the Gates Rubber Engineer. (Just look under "Gates Rubber" in your phone book.) He will come right to your plant—will thoroughly analyze any drive problem you may have—and he will always recommend the practice that will be most efficient and economical for you.

4410

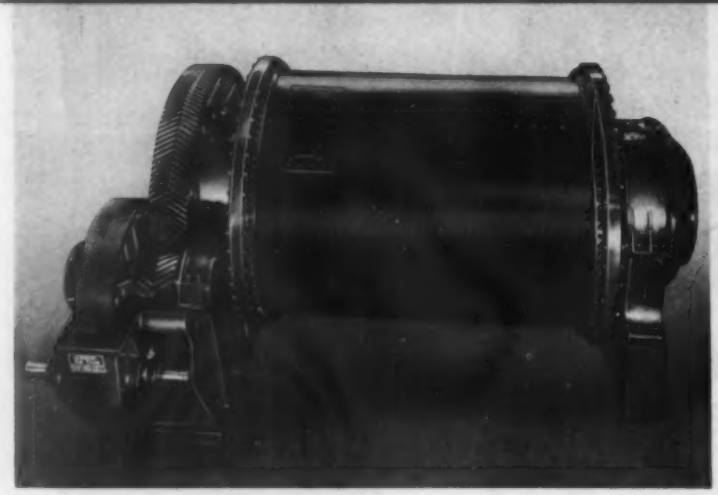
THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington
NEW YORK CITY 215-219 Fourth Avenue
ATLANTA, GA. 738 C & S National Bank Building
LOS ANGELES, CAL. 2240 East Washington Boulevard
DENVER, COLO. 909 South Broadway
DETROIT, MICH. 8663 Grand River Avenue
PORTLAND, ORE. 333 N. W. 5th Avenue
DALLAS, TEXAS 2213 Griffin Street
SAN FRANCISCO, CAL. 1090 Bryant Street

KENNEDY *gives you*



WE MANUFACTURE MACHINERY FOR A COMPLETE CEMENT PLANT . . .

KENNEDY INTEGRAL GEAR DRIVEN TUBE MILL

The new KENNEDY Integral Gear Drive for Tube Mills can be used on Combination Ball Mills, Wet Grinding Tube Mills, Dry Grinding Tube Mills and Air Swept Tube Mills. It is impossible to mis-align these gears because the gear housing supports both the discharge end of the mill and the roller bearings carrying the gears. All bearing seats are machined in a jig at the factory to a tolerance of 3/1000 of an inch. The assembly of the gear is exactly the same as the reduction gears which everyone knows is the correct way of transmitting power. Thus we save approximately 10% in power over other best well-known types of tube mill gear drives, which means that one can obtain 10% greater production from a given size Kennedy tube or ball mill with a given size motor.

KENNEDY ROTARY KILN

10' x 9' x 250'

Mounted on 4 riding rings. These kilns can be built in any diameter or length desired. We are prepared to furnish complete cement plants and mining plants.

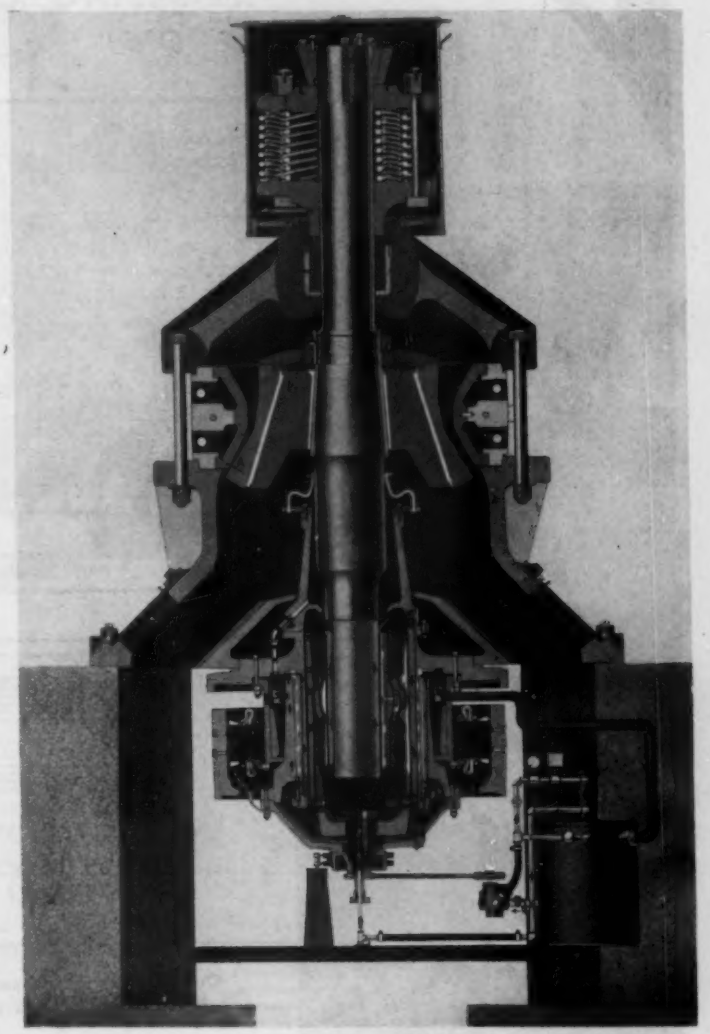
KENNEDY-VAN SAUN MFG. & ENG. CORPORATION

Efficient, Reliable Performance!

A #49½
KENNEDY
BALL BEARING
GEARLESS CRUSHER

with a Synchronous Motor built in its pulley. This machine shows **80% saving in the cost of maintenance** and a saving of **50% in power** over geared crushers. It has produced 156 tons per hour when set to 7/16" between the head and concaves at the bottom.

Write for information on KENNEDY Ball Bearing Gearless Standard and Secondary Crushers, Jaw Crushers, etc.



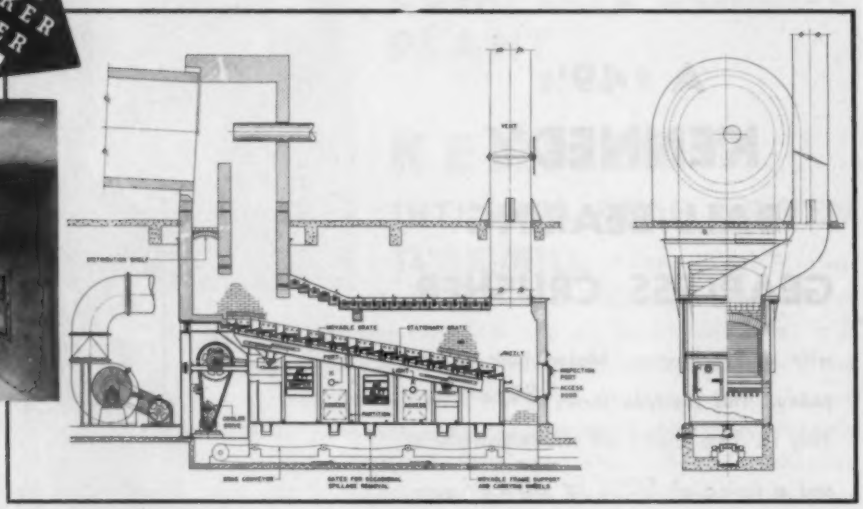
We also manufacture Vibrating Screens and Belt Conveyors. Write for catalogue and description.

2 PARK AVENUE • NEW YORK 16, N. Y. FACTORY: DANVILLE, PA.

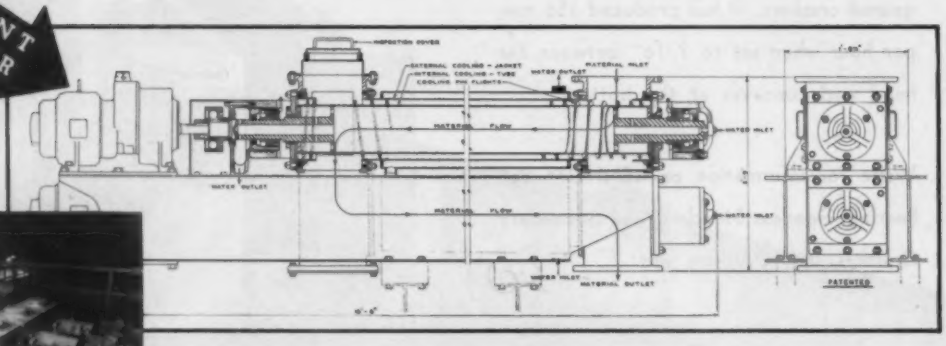
Fuller Coolers

IMPORTANT EQUIPMENT TO BE GIVEN CAREFUL CONSIDERATION BY EVERY FAR-SEEING CEMENT-MILL OPERATOR . . . NOW!

CLINKER COOLER



CEMENT COOLER



Our Engineering Department is at your service. Write us today. We'll be glad to assist you in every way possible.

FULLER COMPANY, CATASAUQUA, PA.

Chicago 3 · 1144 Marquette Bldg.
San Francisco 4 · 421 Chancery Bldg.
Washington 5, D.C. · 618 Colorado Bldg.

CO-14

FULLER COMPANY

FULLER-KINYON, FULLER-FLUXO AND THE AIRVEYOR CONVEYING SYSTEMS . . . ROTARY FEEDERS AND DISCHARGE GATES . . . ROTARY AIR COMPRESSORS AND VACUUM PUMPS . . . AIR-QUENCHING INCLINED-GRATE COOLERS . . . DRY PULVERIZED-MATERIAL COOLER . . . AERATION UNITS . . . MATERIAL-LEVEL INDICATORS . . . MOTION SAFETY SWITCH . . . SLURRY VALVES . . . SAMPLERS

Kansas Gypsum Mine—TRAXCAVATOR mucks out 25 tons per hour with one man.

Rock Bottom

Material Handling Costs

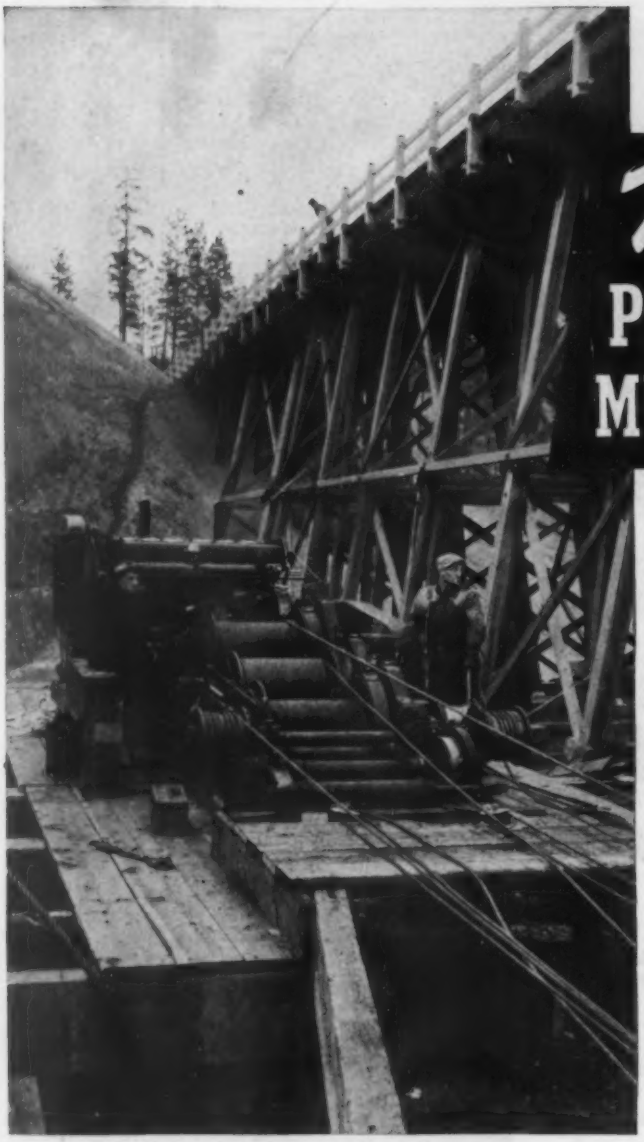
TRAXCAVATORS do a big job—at low cost—in and around mines, quarries, sand and gravel pits . . . digging, loading, clean-up, maintaining haulage roads, drawbar work, etc. Shown above, a TRAXCAVATOR in a Kansas gypsum mine mucks out blasted rock and carries it to mine cars in the entry. Production on this carrying and loading operation is 25 tons per hour—more profitable production than any previously used method.

TRAXCAVATORS, powered by "Caterpillar" track-type tractors carry their loads at tractor speeds, and are able to work in close quarters. Ask your Tracksons-"Caterpillar" dealer for full details on these multi-purpose digging and material handling machines, or write to TRACKSON COMPANY, Milwaukee 1, Wis.

Arizona—Low cost gravel loading from mountainous stock pile.

TRAXCAVATOR

The Original Tractor Excavator



Murphy Diesel Model ME-6, 135 H. P. continuous, powering a 3-drum hoist on derrick, at Columbia River Job, Kettle Falls, Washington

More PROFITS WITH MURPHY DIESELS

MURPHY DIESELS boost profits on hoisting and other jobs on construction projects by supplying dependable low-cost power, efficient and ready to work whenever the job requires . . . always easy to start . . . simple to operate . . . requiring no "premium priced" fuel . . . economical to operate . . . minimum maintenance cost. Compact and relatively light in weight, Murphy Diesels are readily portable, adaptable to every requirement, reliable in coordinating power with operations of other units, on schedule. Practical range of sizes for construction needs. Write for bulletin.

BUY U.S. WAR BONDS

MURPHY DIESEL COMPANY
5315 West Burnham Street
Milwaukee 14, Wis., U. S. A.

DOLLAR for DOLLAR

of First Cost and Operating Cost

THE

3/4-SWING BADGER

MOVES MORE MATERIAL . . . FASTER AND CHEAPER

Check these BADGER FEATURES

- √ Lighter Swinging Weight
- √ Greater Stability
- √ Better Visibility
- √ No Tail Swing
- √ Extra Dumping Height
- √ Extra Reach
- √ Easily Portable
- √ Fully Convertible

AND ASK YOUR NEARBY A-W DEALER to tell you the whole story of how the versatile BADGER will save time and make money for you.

AUSTIN-WESTERN COMPANY
AURORA, ILLINOIS, U. S. A.

BUILDERS OF ROAD MACHINERY SINCE 1859

Austin Western

BUY MORE WAR BONDS

There isn't a soft spot in a quarry, and any piece of equipment that can't take a beating had better stay at home.

That goes for wire rope, too—and it's one of the reasons why Bethlehem Purple Strand gets the roughneck assignments. You'll find Purple Strand rope on the boom and hoist lines of power shovels; you'll find it on dragline equipment, and in the holding and closing lines of grab buckets . . . tough, wearing jobs, every one of them.

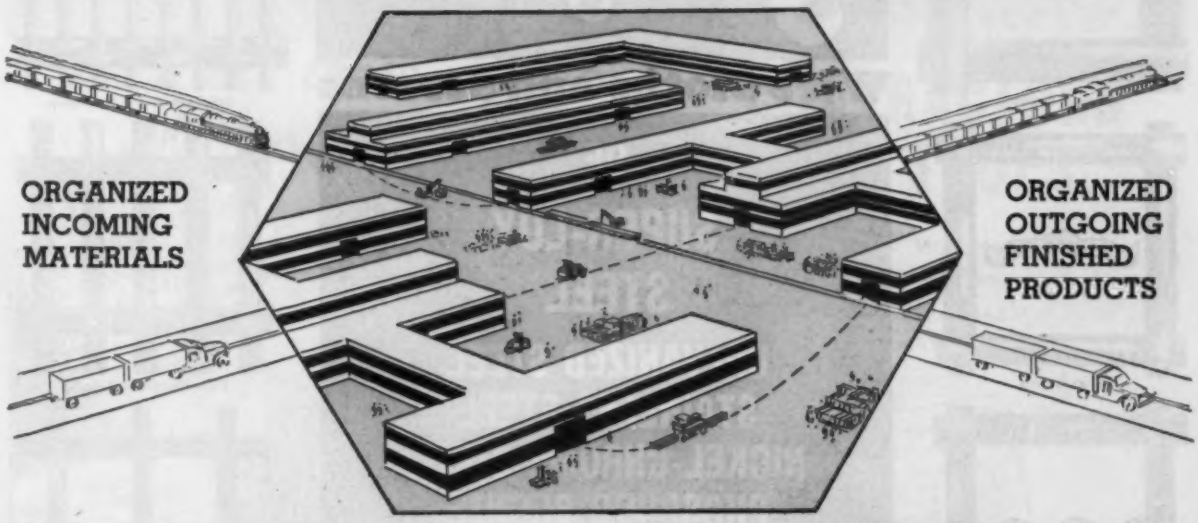
In this kind of work, where the rope is often required to pass around small sheaves, Purple Strand Form-Set (preformed) is frequently specified over the non-preformed type. Form-Set is preferable, too, in derrick and crane service where the motion of the suspended load tends to twist the lines, for its "life expectancy" is considerably greater than that of ordinary rope.

The tougher the job, the more you need Purple Strand—either Form-Set or non-preformed, as circumstances require. Why not ask a Bethlehem man to explain its solid advantages?

When you think WIRE ROPE

. . . think BETHLEHEM

Is your INTRA-PLANT distribution this well organized?



It can be the HYSTER way!

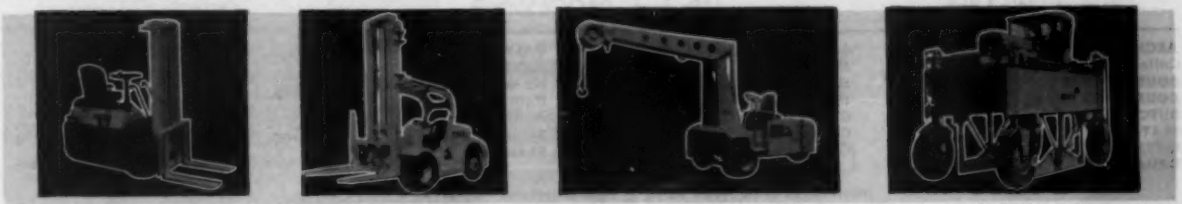
Freight bills give you exact handling costs of in-coming and out-going shipments. Schedules are religiously maintained. Outside transportation companies know exactly how much, when and where. *How well is YOUR intra-plant distribution organized? What are YOUR materials handling costs?*

This information is vital to your materials handling methods to meet post-war requirements. It should include all Intra-Plant handling from receipt of raw materials, thru all stages of manufacture, and then to storage or out-going delivery platforms . . . It should cover daily tonnage and loads, or trips, to all intra-plant destinations.

Investigate how HYSTER Mobile Materials Handling Machines will fit in with your organization needs . . . for systematized scheduling . . . for speed, efficiency and lower cost per ton of materials handled.

In the complete line of HYSTER Lift Trucks, Crane Trucks and Straddle Trucks, machines are available for handling your kinds of materials.

Write for information.



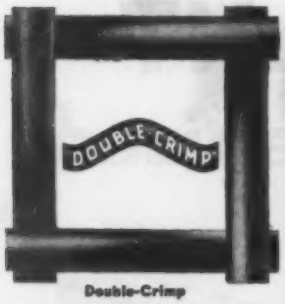
HYSTER Lift Trucks; 2000 to 15,000 lb. capacities. HYSTER Karry Krane; 10,000 lb. capacity. HYSTER Straddle Trucks; 12,000 & 30,000 lb. capacities.

HYSTER Company

Pioneer manufacturers of mobile materials handling machines; all gasoline powered; all pneumatic tire mounted.

— FACTORIES —
2935 N. E. Clackamas - Portland 8, Oregon
1835 North Adams - Peoria 1, Illinois

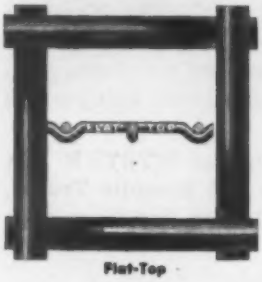
BRANCH OFFICES: 221 N. LaSalle St., Chicago 1, Ill.; 90 West St., New York 6, N. Y.; 1022 Denrike Bldg., Washington 5, D. C.; 233 Ninth Street, San Francisco 3, Calif. Masonic Bldg., New Orleans 12, La.; 2724 First Ave. So., Seattle 4, Wash.; 2700 Santa Fe Avenue, Los Angeles 11, Calif.; 215 Euclid Ave., Cleveland 14, Ohio; 211 Farnsworth Bldg., Memphis 3, Tenn.



Double-Crimp

Arch-Crimp

Intermediate-Crimp



Flat-Top

"The Perfect"

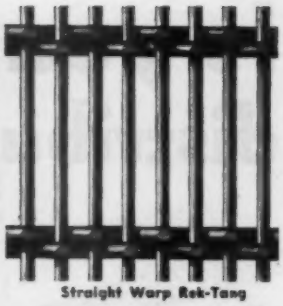
Wire Cloths and Screens

OF

SUPER-LOY STEEL

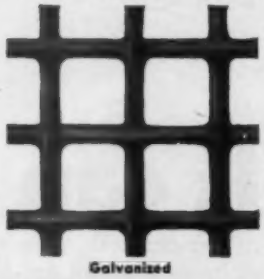
GALVANIZED STEEL
STAINLESS STEEL
NICKEL-CHROME STEEL
PHOSPHOR BRONZE
BRASS
COPPER
MONEL
NICKEL
ALUMINUM

ANY SPECIAL METAL FOR ANY SERVICE

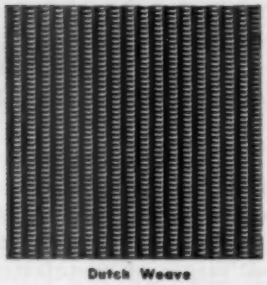


Straight Warp Rek-Tang

Calendered Rek-Tang



Galvanized



Dutch Weave

"Perfect" WEAVES

ARCH-CRIMP
Coiled
DOUBLE-CRIMP
DOUBLE-FILL
DUTCH
FLAT-TOP
INTERMEDIATE-CRIMP
REK-TANG
Selvage-Edge
STRAIGHT-WARP
Stranded
STA-TRU
Triple-Warp
Twilled
Twisted-Fill
Twisted-Warp

"Perfect" PROCESSING

Arc-Welding
Bending
Binding
Brazing
CALENDERING
Coiling
Crimping
Cutting
Dipping
Dishing
Finishing
Flanging
Flattening
Forming
Framing
GALVANIZING
Jointing
Knuckling
Painting
Rolling
Selvaging
Shaping
Shearing
Slitting
Soldering
Spot-Welding
Squaring
Stitching
Tack Welding
Trimming

"Perfect" PRODUCTS

Baskets
Circles
Coils
Cones
Cylinders
Discs
Forms
Leaves
Lengths
Panels
Pieces
Ribbons
Rings
Rolls
Sections
Segments
Strips
Templates

Illustrations show items listed in capital letters. Other wire cloths and screens will be illustrated in subsequent advertisements of this series.

Sta-Tru

THE LUDLOW-SAYLOR WIRE CO.

ST. LOUIS 10, MISSOURI

"MEASURED AIR" PROVIDES

- MORE POWER—LONGER LIFE
- LESS OPERATING COST
- MORE WORK DONE FASTER

with all these

Thor CONTRACTORS' AIR TOOLS!

Thor "AIR ECONOMY" FIGURED IN YOUR POST-WAR EQUIPMENT PLANS WILL SAVE YOU TIME, CUT COSTS . . . GET TOMORROW'S JOBS STARTED FAST AND MOVING!

The maximum power, balanced stroke and ease of handling provided by exclusive Thor *"measured air"* construction is available in every one of these Thor Contractors' Air Tools to save you time and operating costs on *all* construction jobs.

THOR PAVING BREAKERS

Thor Paving Breakers, light, medium and heavy duty models, are equipped with the same "measured air" type of short-travel tubular valve as Thor Rock Drills.

The Paving Breaker valve actuates a block type piston, powering it with exactly the quantity of air required for both the forward and return strokes . . . minimizes vibration . . . makes the machine easy to handle.

THOR CLAY DIGGERS

Air that powers the stroke of Thor Clay and Trench Diggers is measured by a new short-travel cylinder "rocker" valve which provides *perfect sealing and control* of required pressure for driving the piston.

HOW Thor "MEASURED AIR" ECONOMY WORKS!

Short-travel valve action is the real secret behind Thor "measured air" economy.

The shorter the travel, the more positive the action of the valve in admitting to the tool only the required amount of air—in instantly sealing the inlet against excess air.

Short-travel action reduces wear on the valve, retains positive "measure" of air for a greatly extended period of service.

Short-travel valve action powers each stroke of the tool with the same quantity of air—providing smooth, uniform operation. Elimination of excess air keeps out of the channel the overload of power that staggers the stroke and causes vibration.

For particulars about *automatic rotation . . . cushioned action . . . automatic lubrication . . . exclusive retainer design*, and many other features of Thor Contractors' Air Tools, write today for Catalog No. 42-A.

THOR ROCK DRILLS

A short-travel tubular valve, heat-treated for durability and precision-ground for perfect fit, "measures" air that powers all three types of Thor Rock Drills—Sinkers, Drifters and Stopers.

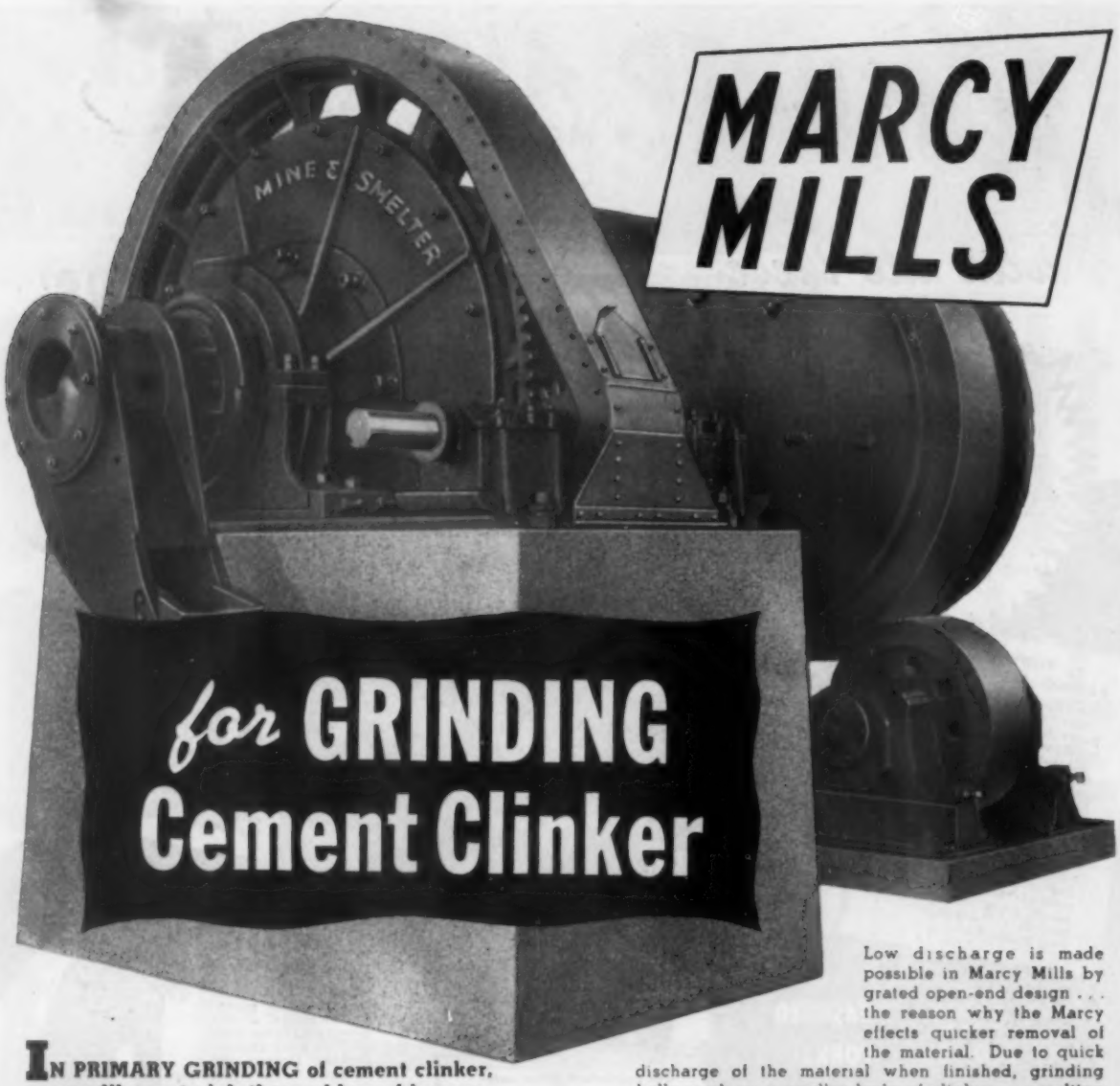
This precise control of air consumption provides steady power and smoothness in the *automatic rotation* of these drills. *Controlled air* driving the piston gives the steel on the working end maximum forward and rotative action . . . assures fast drilling speed!

Thor Portable Pneumatic and Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY

EXPORT DIVISION
330 W. 42ND ST., NEW YORK, N. Y., U.S.A.

THOR ROCK DRILLS	THOR DRIFTER ROCK DRILLS	THOR STOPER ROCK DRILLS	THOR PAVING BREAKERS	THOR CLAY AND TRENCH DIGGERS	THOR BACKFILL TAMPERS	THOR SUMP PUMPS
Six light, medium and heavy duty models for all rock formations.	One light, and one medium weight model, hand or power feed, for all hard rock drilling.	One medium, and one heavy duty model for stoping under all drilling conditions.	Four light, medium and heavy duty models for all demolition work.	One light, medium and heavy duty model of each for all tunnel and well work.	One light and one heavy duty model for tamping clay and other soil materials.	One current model, designed for all jobs under most unfavorable



MARCY MILLS

for GRINDING Cement Clinker

Low discharge is made possible in Marcy Mills by grated open-end design . . . the reason why the Marcy effects quicker removal of the material. Due to quick discharge of the material when finished, grinding balls work on a smaller body of clinker — resulting in more useful work from the grinding media.

IN PRIMARY GRINDING of cement clinker, or any like material, the problem of increasing tonnage is usually considered a matter of increasing the SIZE of the grinding units. Without using a larger mill, the Marcy gets more tonnage—and lower grinding cost per ton — simply by discharging the product from the mill as soon as the grinding is completed, without wasteful over-grinding . . . . If you are now planning for tomorrow's necessarily lower costs, let us have a look at your drafting boards.

Main Office: Denver, Colorado, U.S.A.
El Paso, Salt Lake City, 1775 Broadway, N.Y.
Canadian Vickers, Ltd., Montreal
W. R. Judson, Santiago and Lima

Genuine Wilfley Tables; Massco-McCarthy Hot Millers; Rock Bit Grinders; Density Controllers; Belt Feeders; Pinch Valves; LABORATORY EQUIPMENT; MINE & MILL SUPPLIES; COMPLETE MILLING PLANTS.

The Mine & Smelter SUPPLY CO.

This "Whirlwind" works for you

No physical principle has equalled the effectiveness of air separation in sizing fine materials. No air separator has equalled the *Sturtevant* "Whirlwind" in mechanical efficiency.

The *Sturtevant* is the only Air Separator that is quickly adjustable to an infinite variety of adjustments to meet all requirements and specifications.

Cement producers have been setting new production records with the help of *Sturtevant Air Separators*—the perfectly balanced machine with the flexible control.

INSTALLED ON APPROVAL

In Cement Alone, Hundreds of Sturtevant Air Separators Have Been Installed "On Approval"—Not One Rejected. Here are some of the reasons for this remarkable record: (1) Range of fineness from 40 to 350 mesh, (2) capacities of ¼ ton to 50 t.p.h., while increasing mill capacity as much as 300%, (3) controlled specific surface area, (4) lowered mill and product temperatures.

Sturtevant Air Separators make it possible to meet more exact specifications profitably. By increasing mill capacities from 25% to 300%, grinding costs are lowered. Power consumption reduction of from 10% to 50%.

Write for latest bulletin and engineering information now!

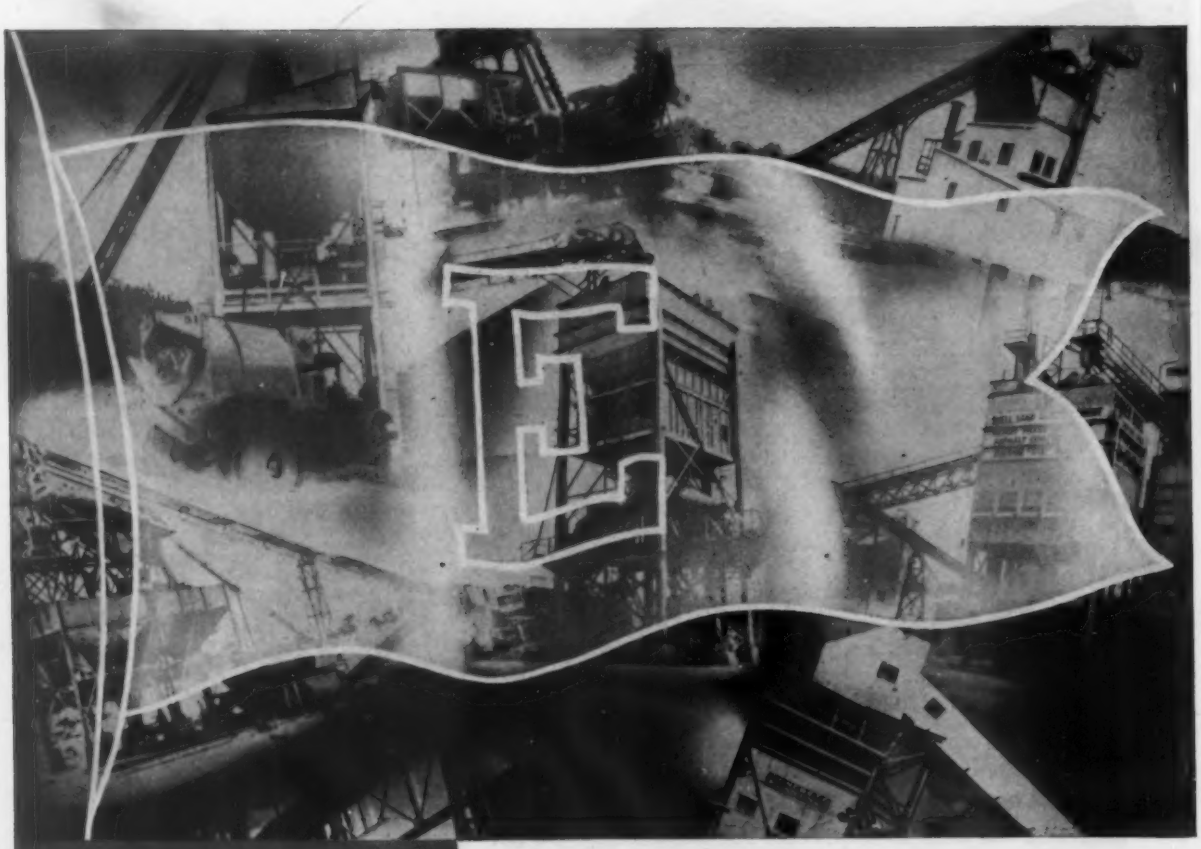
STURTEVANT MILL CO.
HARRISON SQUARE • BOSTON 22, MASSACHUSETTS

STURTEVANT

AIR SEPARATORS
CRUSHING ROLLS
MOTO-VIBRO SCREENS

RING-ROLL MILLS

JAW CRUSHERS
SWING-SLEDGE MILLS
ROTARY FINE CRUSHERS



these users of BUTLER EQUIPMENT who have won the Army-Navy E*

Austin Company
W. S. Bellows
Brown & Root Co.
Cauldwell-Wingate Co.
Doyle & Russell
Henry Ericsson Co.
H. K. Ferguson Co.
George A. Fuller Co.
Great Lakes Dredge & Dock Co.
S. J. Groves & Sons Co.
Johnson, Drake, and Piper Co.
Peter Kiewits' Sons Co.
Long Construction Co.
Mahoney Troast Construction Co.
Manhattan Construction Co.
Maxon Construction Co.
McLean Contracting Co.
John McShain, Inc.
Merritt-Chapman & Scott Corp.
Raisler Corp.
Frederick Snare Corp.
J. Rich Steers, Inc.
James Stewart & Co., Inc.
T. Stuart & Son Co.
Turner Construction Co.
Virginia Engineering Co.
Walsh Construction Co.
Wigton-Abbot Corp.

BUTLER *Congratulates*

its friends and customers who have won the Army-Navy "E" Award — an honor given only for exceptional service in providing vital facilities for waging our global war.

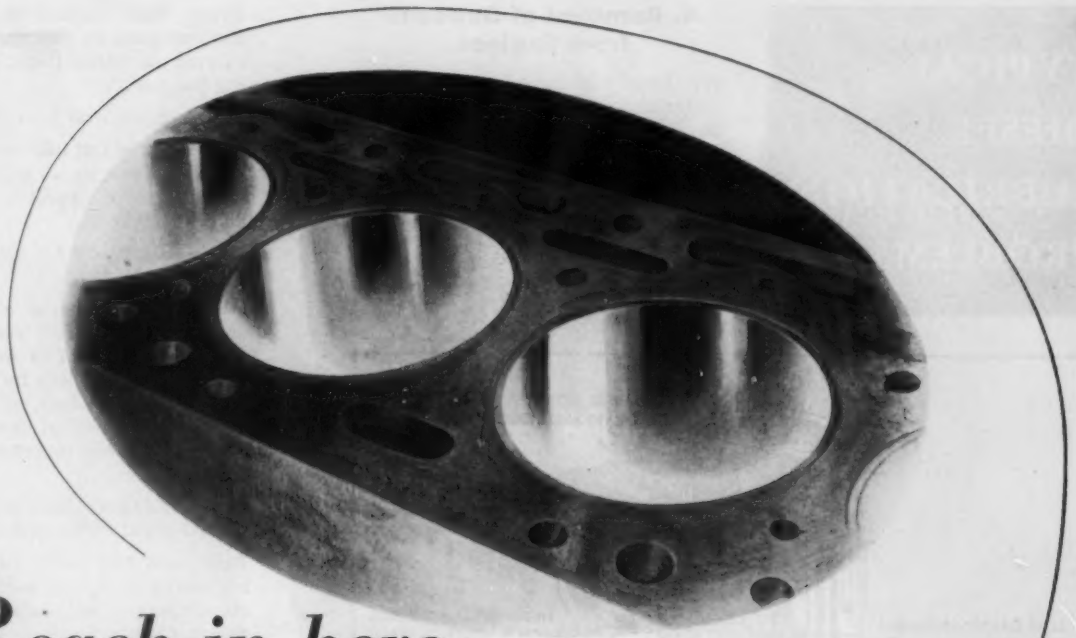
The Butler Bin Company is proud of the part its equipment has played in the speedy completion of the projects of these outstanding construction firms; proud that efficient equipment teamed with efficient management helped to work production miracles.

No accident is the performance of this equipment. Every plant is an Engineered Design, planned to meet all local conditions and tailor-made for each job; efficient, trouble-free operation is built in.

Butler concrete plants, central mixing plants, aggregate plants, and road building equipment are now at work on vital war construction. Whether you are planning a war or post-war project, plan now to use Butler equipment; our engineers will gladly work with you in this first step toward Excellence in Production.

* We have tried to make this list complete to the best of our knowledge; but to any Butler equipment operators who have won the burgee whom we may have missed, our sincerest apologies.

BUTLER
BIN COMPANY
WAUKESHA, WISCONSIN



Reach in here for 350,000 Extra Miles

Extra miles . . . extra hours . . . are in this engine because PORUS-KROME* has been applied to the cylinder walls. This is where the greatest wear occurs in engines and PORUS-KROME extends the life of these walls 4 to 20 times.

The ability to resist corrosion is inherent in chromium and is well known. The ability to resist cylinder wear, also, is inherent in this new form of chromium . . . PORUS-KROME . . . and is being demonstrated daily in thousands upon thousands of engines in use by the Army and Navy, and in essential civilian operations.

PORUS-KROME, produced by the Van der Horst process, is different from ordinary chrome because it has tiny open pores and channels in the surface. These pores and channels serve as reservoirs to hold lubricating oil . . . and then feed it back to the cylinder walls as needed. This excellent lubrication reduces wear, scoring and scuffing to a minimum.

Both corrosion and wear . . . those two enemies of long engine life . . . can be defeated at last. You can multiply the cylinder life of your engines 4 to 20 times . . . specify PORUS-KROME in engines you buy.

* PORUS-KROME is pure, hard chromium, applied to cylinder walls and other bearing surfaces by the patented Van der Horst process. It resists corrosion and wear in cylinders better than any known metal. Records prove that it multiplies cylinder life four to twenty times.

VAN DER HORST

U. S. PATENTS 2,048,578 AND 2,314,084

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST CORPORATION OF AMERICA • OLEAN, NEW YORK • CLEVELAND 11, OHIO

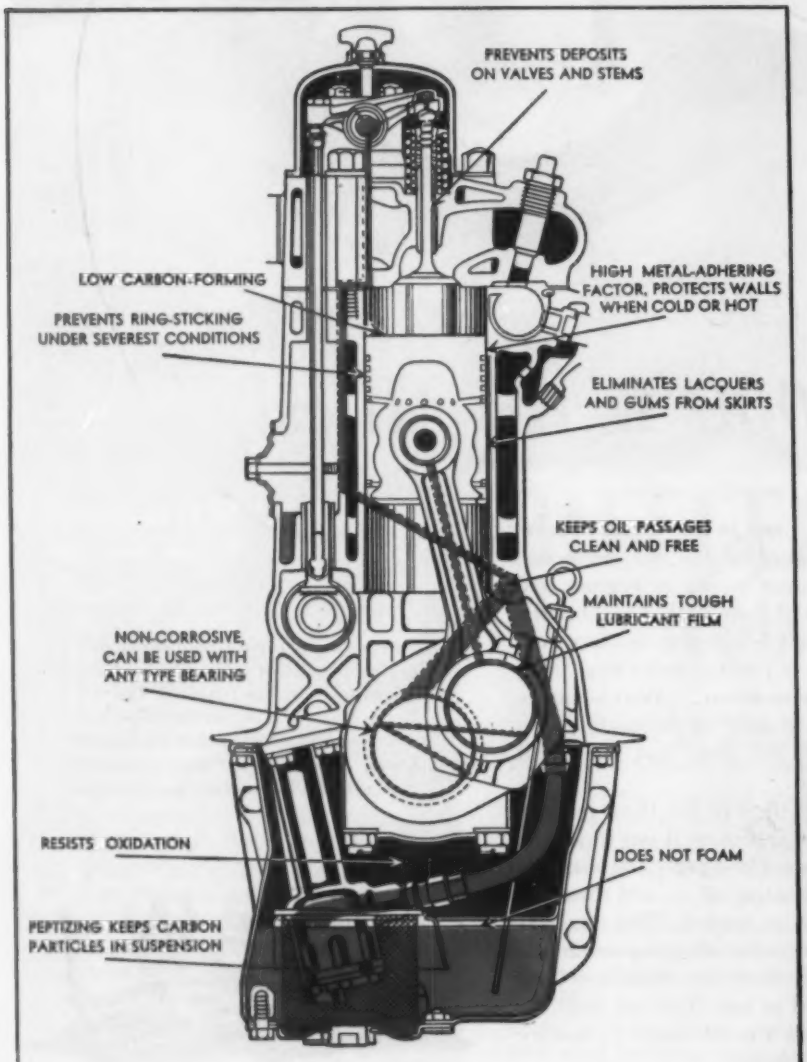
AN AFFILIATE OF BREEDER INDUSTRIES

TYPICAL DIESEL LUBRICATION PROBLEMS:

4. Removal of Deposits from Engines

RPM DELO will clean your engine of sludge and other deposits, even in the ring-belt, unless accumulations of carbon, gum, varnish, etc., have cemented rings so tightly that oil cannot get behind them. The following procedure is recommended for purging conventional engine systems:

1. Drain present oil from crankcase while hot.
2. Renew filter element to trap abrasive particles that may be carried in circulation during purging.
3. Fill crankcase with RPM DELO.
4. Run engine at fast idle for two hours, maintaining water jacket temperature of approximately 200° F. minimum.
5. Drain again while hot and refill with RPM DELO.
6. Place engine in regular service and drain at one-half normal drain period or 750 miles, whichever comes first, for two or three drains. Check oil frequently as removal of deposits may temporarily increase oil consumption.
7. Drain while hot. Check oil filter and replace when necessary.
8. Refill with RPM DELO, returning to regular oil drain and filter change period, and continue to use RPM DELO.


PREVENTS DEPOSITS ON VALVES AND STEMS
LOW CARBON-FORMING
PREVENTS RING-STICKING UNDER SEVEREST CONDITIONS
HIGH METAL-ADHERING FACTOR, PROTECTS WALLS WHEN COLD OR HOT
ELIMINATES LACQUERS AND GUMS FROM SKIRTS
KEEPS OIL PASSAGES CLEAN AND FREE
MAINTAINS TOUGH LUBRICANT FILM
NON-CORROSIVE, CAN BE USED WITH ANY TYPE BEARING
RESISTS OXIDATION
DOES NOT FOAM
PEPTIZING KEEPS CARBON PARTICLES IN SUSPENSION

This diagram of a typical Diesel engine shows how RPM DELO keeps rings free and maintains clean operation.

RPM DELO is made from base oils especially selected for non-deposit-forming characteristics, and contains a detergent which keeps foreign particles in suspension. It also contains an anti-oxidant which prevents the formation of gums and lacquers. It is non-corrosive, may be used with any type of bearing.

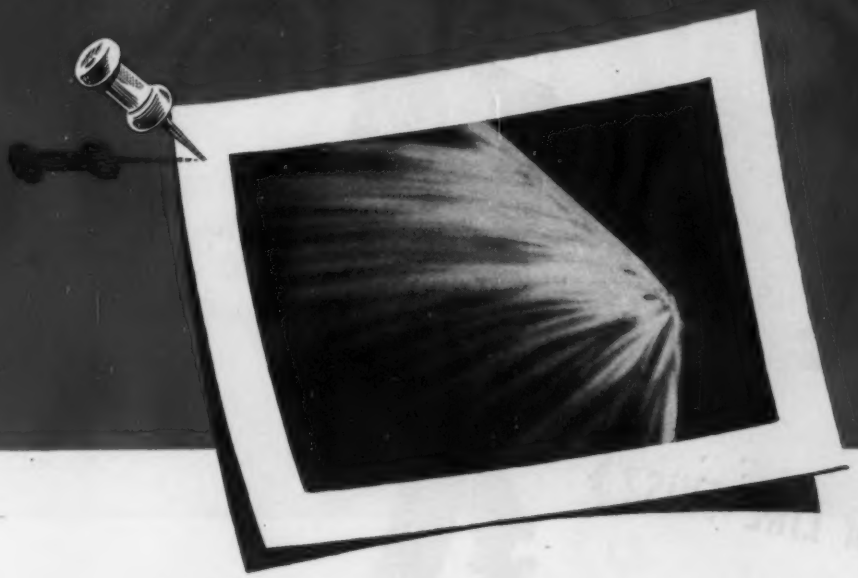
RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial RPM DELO (Concentrate). Ask your Diesel engine manufacturer or distributor for the name of the RPM DELO supplier in your vicinity.

The typical cleanliness of engine parts when RPM DELO is used is illustrated by this oil filter removed from an engine used in heavy duty Diesel bus service for 50,000 miles. Oil pump screen and valve chamber were comparably clean.

RPM DELO

STANDARD OF CALIFORNIA

SNAPSHOT of an explosion



HERE IS A STORY OF AN EXPLOSION—as told by the explosive itself. The narrow, white streak at the right is the path of detonation, flashing through the explosive at about 250 miles a minute! The feathery haze is a photographic record of white-hot gases bursting outward at tremendous pressures as high as a million pounds to the square inch.

Facts such as these are recorded, studied, and analyzed by Hercules scientists. Each day scores of research projects are carried on to broaden the knowledge and understanding of explosives. It is through constant, intelligent research that we endeavor to help you and thus benefit ourselves.

HERCULES EXPLOSIVES

HERCULES POWDER COMPANY
INCORPORATED
946 King Street
Wilmington 99 . . . . . Delaware

Do Your Bags Fit Your Products LIKE THIS...

or LIKE THIS?

IF your products, Multiwall-bagged for shipment, are trim and well-filled like Dapper Dan . . . good!

If, however, the bags fit like Sloppy Joe's suit, you are probably losing time, material and money in your packaging operation.

And chances are that a Plant Service Call by one of the Bemis Multiwall Specialists would result in recommendations that will eliminate the losses. His call will cost you nothing and obligate you in no way. He won't even suggest you buy Bemis Multiwall Bags, because our entire production is now being taken by our regular multiwall customers.

Improper filling is only one of the evils that Bemis Specialists correct. Maybe you can save time, money or manpower by a different arrangement of equipment or plant layout. Or maybe you should use bags of a different type or size. There are a dozen different possibilities.

Our men have helped scores of plants in this manner, and they'll gladly try to help you. Just write us. Remember—no cost, no obligation.

COAST TO COAST—LAKES TO GULF

Bemis Multiwall Plants at

Peoria, Ill.	**East Pepperell, Mass.**
Mobile, Ala.	**Wilmington, Calif.**
San Francisco, Calif.	**St. Helens, Ore.**

These plants not only give us large production, but also quick accessibility to all parts of the country.

BEMIS BRO. BAG CO.

Baltimore • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Denver Detroit • Houston • Indianapolis • Kansas City • Los Angeles • Louisville Memphis • Minneapolis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • St. Louis • Salina • Salt Lake City • Seattle • Wichita

East Pepperell, Mass.

War also needs big BELTS

While Belts of this size are being produced for use in the War Effort, it naturally takes that amount away from the quantity that normally would go to the civilian trade.

Quaker is maintaining Belt Production at peak figures. Demands of the War require thousands of feet. It looks much brighter now to that day when production can be devoted 100% to civilian requirements.

Belts, like the one illustrated, will convey thousands of tons of coal, gravel, sand, cement, crushed stone, concrete, or similar products and do it economically, for Quaker Belts are built to give long service, and they do it!

This 36" 7 Ply Conveyor Belt, made in one piece, is over sixteen hundred feet long, with a net weight of 15,409 pounds, is just one of the many large and unusual Belts that Quaker is continually producing. Years of experience in Belt making, as well as knowledge in the workings of Synthetic Rubber enables us to give you extra high quality Belts—the kind for which Quaker has long been noted.

For sixty years, Quaker has been manufacturing Quality Industrial Products . . . Belting—Hose—Packings—and Moulded Parts. Regardless of what your rubber problem may be, feel free to consult with us—

"If there is a way to get it done—Quaker will do it"

QUAKER RUBBER CORPORATION

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Western Territory

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KEEPING 'EM BUSY

There are two things about this picture to warm the hearts of mining-men. One is the sight of an important mine in full war production. The other is the sight of husky Mack trucks doing their part to keep every shovel working "all out." Each of these Macks, with their 30-ton load capacity, can move 2,160 tons of earth every 24 hours! No wonder mine operators depend so much on Mack. They know its bed-rock toughness, its down-to-earth operating economy—and its 44-year-old reputation for being *more* truck, ready and able to take more punishment, and do more work. They know from experience what "Built like a Mack" means . . . and what a satisfaction it is to have Macks on the job.

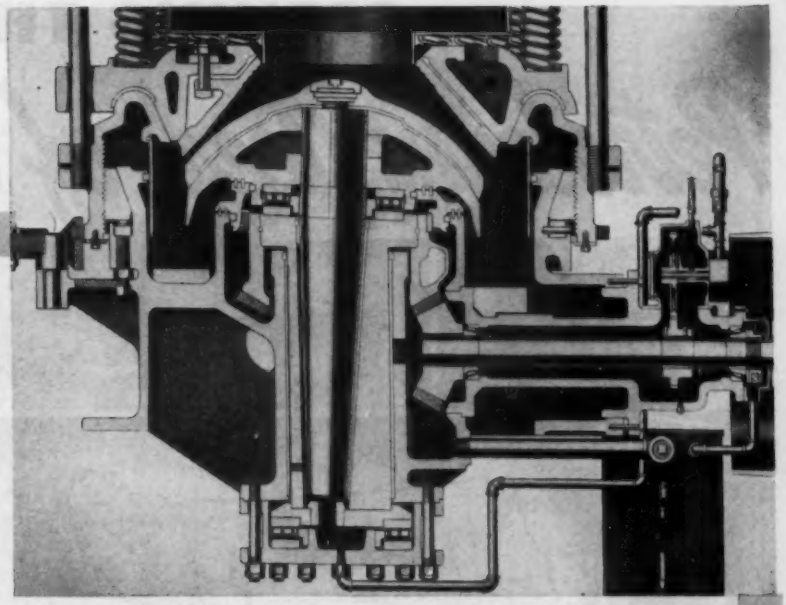
Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

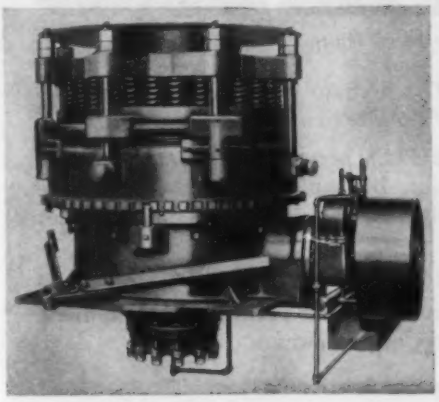
Mack Trucks, Inc., Empire State Building, New York, N. Y.
Factories at Allentown, Pa.; Plainfield, N. J.

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!



What's Different about the

TELSMITH Gyrasphere SECONDARY CRUSHER



The Spherical Head and corresponding concave (shown above) are adapted from the first crusher devised by primitive man—the mortar and pestle. The parts are inverted to facilitate discharge; but the crushing action is the same. Particles are caught and broken *between two multi-curved surfaces,* causing an ideal cubing action. The same mechanism that was used in ancient Egypt now produces an improved cubical aggregate in modern mines and quarries. *Write* for Bulletin Y-11.

Y-4

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Typical Sinclair Refinery, Transportation and Distribution Units.

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- TRANSPORTS 300,000 barrels of crude oil and finished products daily through 14,000 miles of pipe lines; also employs thousands of tank cars and a large fleet of ocean tank ships.
- OPERATES a chain of waterfront terminals from the Gulf of Mexico to New England.
- DISTRIBUTES petroleum products through 2000 wholesale bulk plants which also service a network of many thousands of Sinclair Dealer stations.
- PRODUCES basic material for manufacture of synthetic rubber in one of the largest butadiene plants in the United States.

Sinclair is America's outstanding manufacturer of lubricants.

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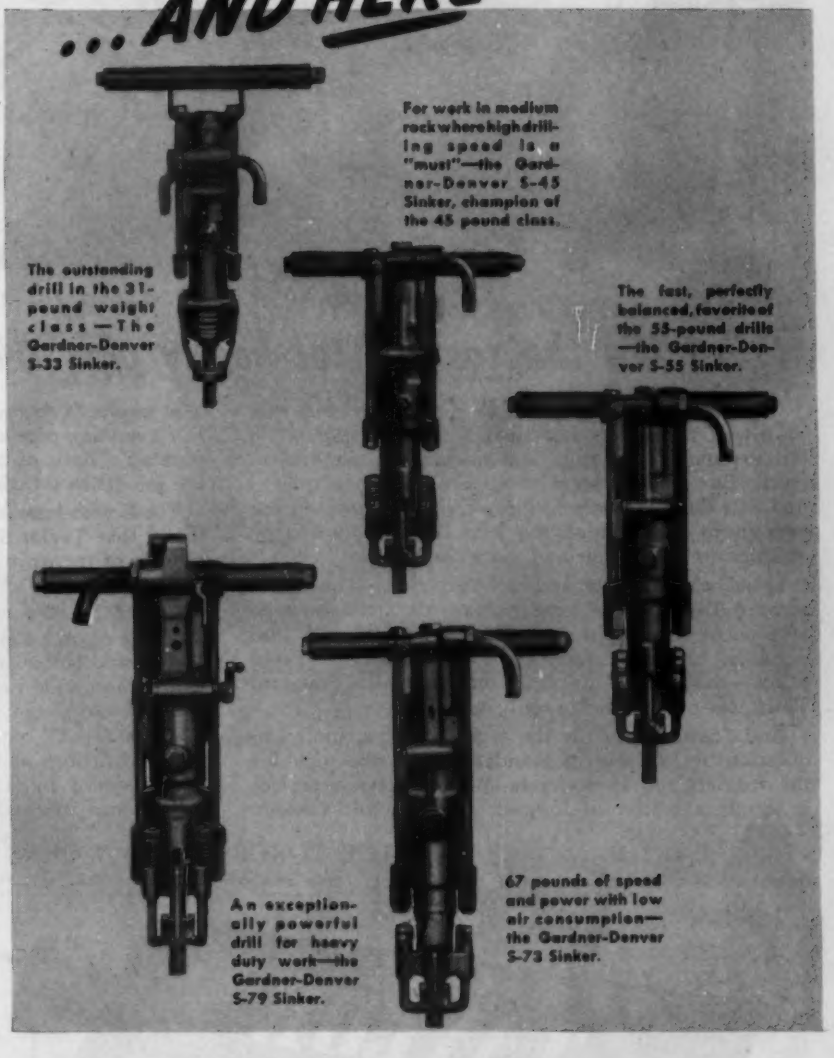
FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

BALANCE COUNTS HERE

... AND HERE


The outstanding drill in the 31-pound weight class—The Gardner-Denver S-33 Sinker.
For work in medium rock where high drilling speed is a "must"—the Gardner-Denver S-45 Sinker, champion of the 45 pound class.
The fast, perfectly balanced, favorite of the 55-pound drills—the Gardner-Denver S-55 Sinker.
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Perfect Balance

. . . that's what makes Gardner-Denver Sinking Drills so popular with contractors and operators alike.

For that perfect balance means smooth, easy riding. And easy riding means less fatigue . . . allows the men to put in more footage per shift—every shift.

Gardner-Denver Sinkers are noted for their hole-cleaning ability—their drilling speed and powerful four-pawl rotation. For that extra performance you want in a sinking drill . . . for speed, dependability and low-cost operation, check the Gardner-Denver line. There's a champion in every weight class.

For complete information and specifications, write Gardner-Denver Company, Quincy, Ill.

Since 1859 **GARDNER-DENVER**

But it's the cost of too-heavy pipe that really hurts!

Of course it doesn't surprise anyone to find that light-wall pipe costs less than heavy-wall pipe . . . less to buy, less to ship, less to support, and less to erect. But it does seem to surprise some people to find that there is a way to make light-wall pipe strong enough to do most of the jobs that are ordinarily assigned to far heavier and more costly pipe.

Spiral construction accomplishes this. The spiral seam in Taylor Spiral Pipe makes it the strongest type of pipe of its weight . . . gives it the strength and durability needed to handle the type of services listed below—the kind of applications for which Standard Thickness pipe is customarily used.

And "customarily" is the word for this, too. Unquestionably the use of Standard Thickness pipe for the ordinary run of moderate and low pressure service is simply a matter of lugging along an old custom. The service is the everyday kind, so it's easier to order just everyday pipe of so-and-so size than to *select* the pipe on a basis of rated and proved ability to handle the job at lowest cost.

Those who have broken away from this custom have found that Taylor Spiral Pipe can handle a large percentage of their piping needs . . . handle them in many cases at an installed cost way down to half that of the heavier pipe it so adequately replaces.

Changing to Taylor Spiral Pipe for services like those listed below is made easy by the complete range of sizes and wide variety of fittings. Thicknesses range from 18 to 6 gauge; sizes from 4" to 42"; joint lengths up to 40 ft. All types of end joints and couplings, all kinds of fittings and specials or fabricated assemblies, are produced by Taylor Forge, assuring a complete service and undivided responsibility.

TAYLOR FORGE & PIPE WORKS

General Offices & Works: Chicago, P. O. Box 485 ★ New York Office: 50 Church St. ★ Philadelphia Office: Broad Street Station Bldg.

TAYLOR SPIRAL PIPE

CHANGE TO TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines
- Low Pressure Steam and Air Lines
- Steam and Diesel Exhaust Lines
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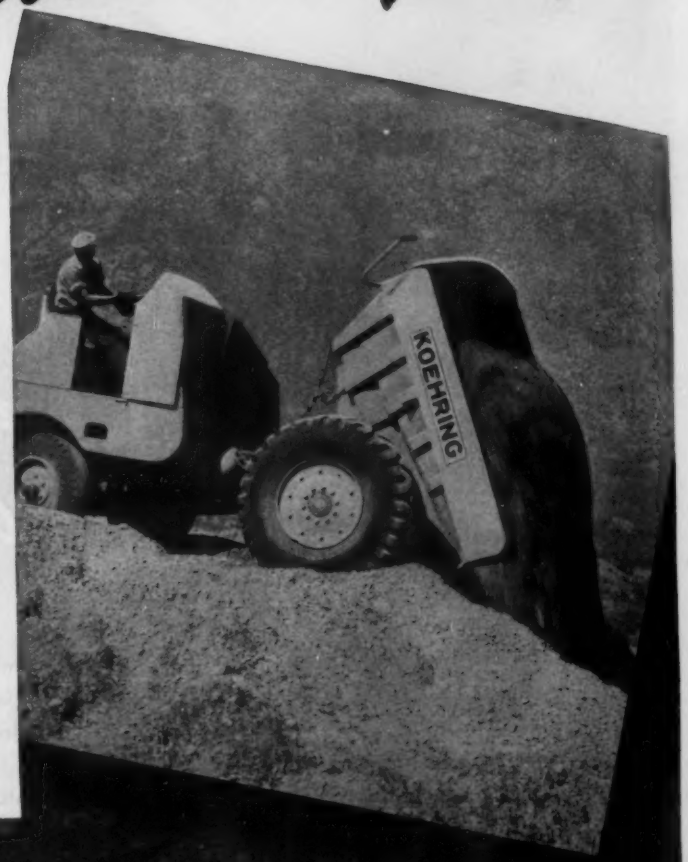
- Blower Piping
- Sand and Gravel Lines
- Industrial Gas Lines
- Oil and Gas Gathering Lines
- Swing Pipe
- Spray Pond Piping
- Hydraulic Mining
- Dredge Lines

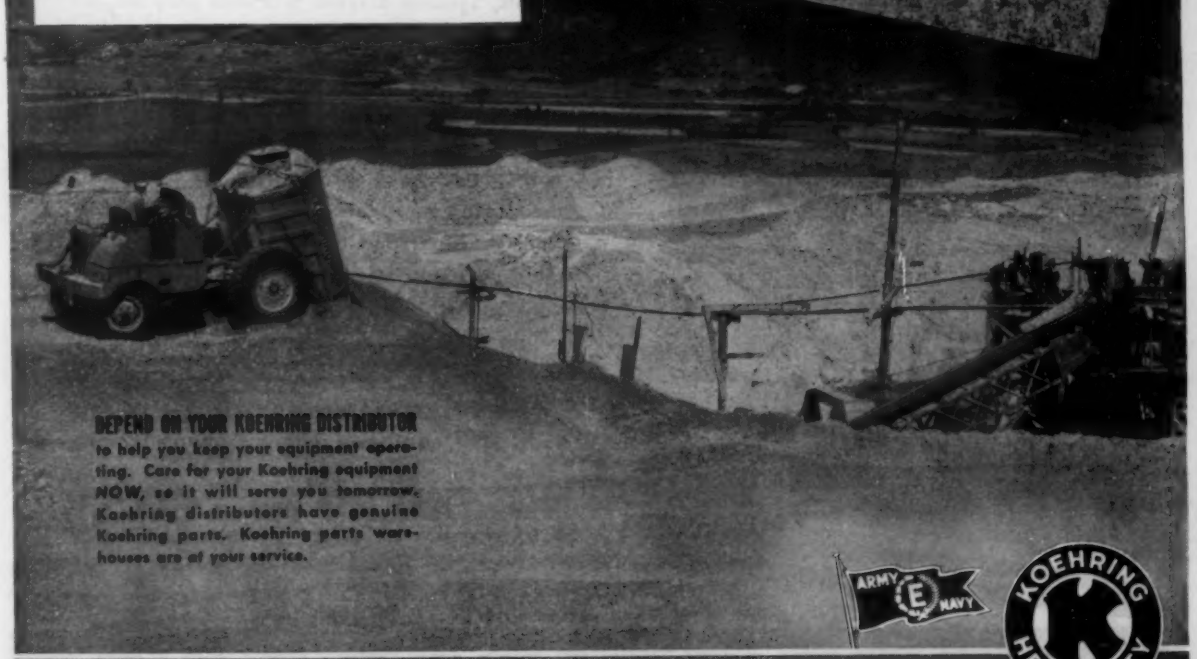
Instantaneous Dumping

ROCK or DIRT
Dumped Instantaneously

Moving rock or dirt at high speed requires speed in all operations. Koehring Dumptors save seconds every time the load is dumped . . . instantaneously. Seconds saved speed production. Rock or dirt is dumped equally fast and the load is dumped clean every time . . . ready for a full load every trip. KOEHRING DUMPTORS HAUL ROCK OR DIRT FASTER THAN ANY OTHER METHOD.

KOEHRING COMPANY
Milwaukee 10, Wisconsin





DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

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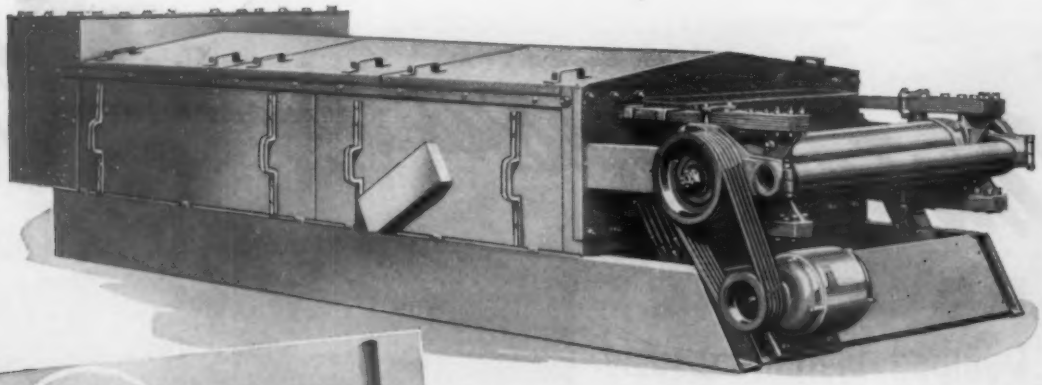
KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT



Standard Steel Corporation plant.

Simplicity System Company plant.

Iowa Manufacturing Company plant.

USED BY LEADING BUILDERS OF "BLACK TOP" PLANTS

Bituminous paving will play an ever important role in the building of airfields, highways and similar construction projects planned for post-war. In providing the materials for "black top" plants, Symons Screens will also play an important role. They are standard equipment for many of the leading builders of such plants.

The Symons Horizontal Screen is specially suited for "hot plant" screening. It is equipped with a dust tight enclosure so arranged that the driving mechanism is outside and away from the dust and heat. Since it sets level, accurate grading is assured. A level screen with its minimum headroom reduces plant height and conveyor length. If you are contemplating this "black top" market, be assured of properly prepared materials by having your plant equipped with a Symons Screen.

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK · LOS ANGELES · LONDON · TORONTO

SYMONS SCREENS

Enlarged reproduction free on request

Squeeze

YOU CAN HELP SQUEEZE THE AXIS

Proper selection, application and usage will make wire rope last longer, thus making more of it available for vital war needs. Let us send you a copy of "Know Your Ropes"—an 82 page book filled with illustrations, diagrams, charts and helpful suggestions for lengthening rope life.

SEND FOR YOUR FREE COPY

The United Nations are putting the squeeze on the Axis. Stout steel muscles of Wickwire Rope are doing everything they can to apply the pressure.

How? In forests, mines, oil fields and shipyards the strong, flexible muscles of Wickwire Rope are helping produce supplies for our fighting forces. And our men abroad will tell you that wire rope helps clear the roads and speed supplies to hasten destruction of Axis strongholds.

Wickwire Spencer has spent over 123 years making the wire that is the "muscle" of Wickwire Rope and WISSCOLAY Preformed. During that time Wickwire Spencer engineers have pioneered many important advances and have built a reputation for high, dependable quality that we aim to continue. If you have a wire rope problem we will be happy to be of service.

Send your wire rope questions to:

WICKWIRE SPENCER STEEL COMPANY

500 FIFTH AVENUE, NEW YORK 18, N. Y.

Abilene • Buffalo • Chattanooga • Chicago • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

TALK ABOUT CONVERSION—

Read These Facts!

Before—

Beu & Sons, Sumner, Iowa, "190-G" Universal crushing, screening and loading plant with 10"x36" jaw crusher, is shown producing aggregates near Pine Lake State Park, Hardin County, Iowa. Output averaged 1,500 yards per 10½ hour day from an unusually deep pit and ran as high as 2,200 yards in a 12½ hour day.

This progressive contractor recently took a contract for agricultural limestone in northern Iowa.

After—

The jaw crusher on the "190-G" was readily replaced by a Universal No. 4 hammermill and a Universal primary unit consisting of a 20" x 36" roller bearing jaw crusher with apron feeder was added providing a "tailor made" plant capable of handling the new contract. The revamped plant is shown operating near Ackley, Iowa. As much as 125 tons of aglime per hour have been turned out, averaging better than 100 tons per hour.

This is another case where standard Universal units were economically used to readily convert a plant. There is no end to the variety of combinations that are possible using standard Universal "packaged units."

Handle aggregates today, riprap tomorrow, ballast next month.

Universal engineers and field men have the answers to your conversion problems.

UNIVERSAL ENGINEERING CORP.
617 C Avenue, West Cedar Rapids, Iowa

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Start Post-War Planning Now!

"THEY DON'T MAKE 'EM ANY BETTER THAN SUPERIOR DIESEL"

SUPERIOR ENGINES

Division of The National Supply Co.

Executive Offices: Pittsburgh, Pa.

Sales Offices: Springfield, Ohio; Boston; New York; Philadelphia; Washington, D. C.; Jacksonville; Houston; Fort Worth; Tulsa; Los Angeles; Chicago.

Factory: Springfield, Ohio.

Superior DIESELS • STATIONARY, 31 to 1200 H. P.

MARINE, 28 to 1200 H. P. • GENERATOR SETS, 12½ to 770 kw.

Let's forget all this talk of

Post-War Dreaming . . .

Let's forget for a moment those "miracle" homes and visionary automobiles—those "magical" new materials and revolutionary revisions in manufacturing methods. Let's just consider one fundamental, time-tested truth: industrial progress has always been evolutionary . . . never revolutionary.

But the evolutionary pace of industrial improvement has quickened with the war. And because post-war competition will be severe — brutally severe — far-sighted production engineers are asking themselves some searching questions:

"Will our existing operational systems deliver profitable production in a highly competitive market? . . . Will our older machinery slow down production—prove too costly under carefully computed accounting? . . . Is there a possibility our new machinery may be obsolete after the war?"

Robins, the originator of conveying with a troughed shaped Belt, is constantly answering such questions for a wide variety of industries that use materials handling machinery. For instance, Robins engineers recently made a complete production analysis in a large industrial plant. The results included the elimination of one entire and costly operation which the officers hadn't even dreamed could be eliminated.

After Robins had demonstrated improvements in operational methods, auxiliary machinery was designed and built which increased the capacity of older, existing equipment. As the result of these changes, the entire war production of the plant was increased, operating costs were lowered . . . and the future competitive position of the company was immeasurably strengthened.

And yet this company had not realized that such improvements were possible until Robins had completed its analysis.

Perhaps there are similar "unknowns"—as well as "knowns"—in your own plant. If you will explain your conditions fully, a Robins engineer from any of our ten branch offices is available for consultation without cost or obligation. When writing, please address Dept. RP-10.

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS CONVEYORS
INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

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FOR MATERIAL AID IN MATERIALS HANDLING . . . . . It's **ROBINS**

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TRADEPRESS PUBLISHING CORPORATION • 309 W. JACKSON BLVD., CHICAGO, 6

RE-EMPLOYING WAR VETERANS

FEW EMPLOYERS will seek to evade their moral obligations in the matter of re-employing veterans who left their jobs to go to war. However, many perplexing questions requiring close study will arise in connection with veterans' rights as set forth in the re-employment provisions of the Selective Service Act.

Many industrial plants have been so changed under wartime conditions that well-meaning employers will have their hands full when the time comes for mass re-employment. Some plants are no longer in business and some companies have expanded so much that it will be difficult, or impossible, to re-absorb all the men who have been briefly employed and then have gone into the services.

Tremendously expanded war industries, such as aircraft, shipbuilding and munitions, will find it difficult to provide jobs in the face of cutbacks and cancellations of orders. Rock products companies that have turned their entire production to war orders may find they are in the same category to a lessened extent.

The fact remains that a veteran is entitled to his old job, or an equal one, if the job was not temporary, if he is honorably discharged, and he can still perform the duties of that job. Of course, he must make application for re-employment within 40 days after his discharge from service and it must not be impossible or unreasonable for an employer to furnish such employment. The veteran is entitled to full seniority and insurance or other employe benefits in effect, and may not be discharged from his job without cause within one year.

The condition that work must be provided for one year will be complicating, in cases where sharp curtailment must come, and, according to Selective Service officials, may make it necessary to lay off loyal workers of high seniority who have kept vital plants in production throughout the war. That's the way things look unless that part of the Selective Service Act is amended by Congress.

There is likely to develop considerable friction between management and labor insofar as the meaning of "seniority" is phrased in the Law. It makes no difference whether a returning veteran is a Union member or not. He is entitled to reinstatement even if a Union employe with more years of service must be dismissed, to make room for him. Apparently, Union rules and regulations were not considered, in writing the Law. No doubt court decisions will have to set precedents to govern whether it is impossible or unreasonable to supply a job.

Many interpretations of provisions of the Act have been made. For instance, if a sand and gravel or crushed stone producer operates a number of plants at different locations and a veteran left a plant and returns to find it closed, he must be put to work in one of the other plants, *provided* it had been understood that an employe may be assigned from one plant to another. A returning veteran can experiment with other jobs, even be hired by a competitor, and still claim his old job if he makes application for it within 40 days after his separation from service.

We have mentioned the foregoing instances to emphasize some of the circumstances that will arise when the European war ends. A pamphlet reviewing the obligations of industry to returning veterans, prepared by National Draft headquarters, is available for ten cents from the Superintendent of Documents, Washington, D. C. It might well be secured and studied. Only about 25 percent of the discharged veterans so far have wanted to go back to the exact jobs they left to go to war. Many of them have acquired new aptitudes or interests during service and will want a better position with their former employer or go elsewhere.

Some of the experiences they have had will qualify them for key positions and make it important for the employer to get them back on the payroll. Quite a number of companies already are mailing out questionnaires to veterans for the purpose of determining new experiences of value.

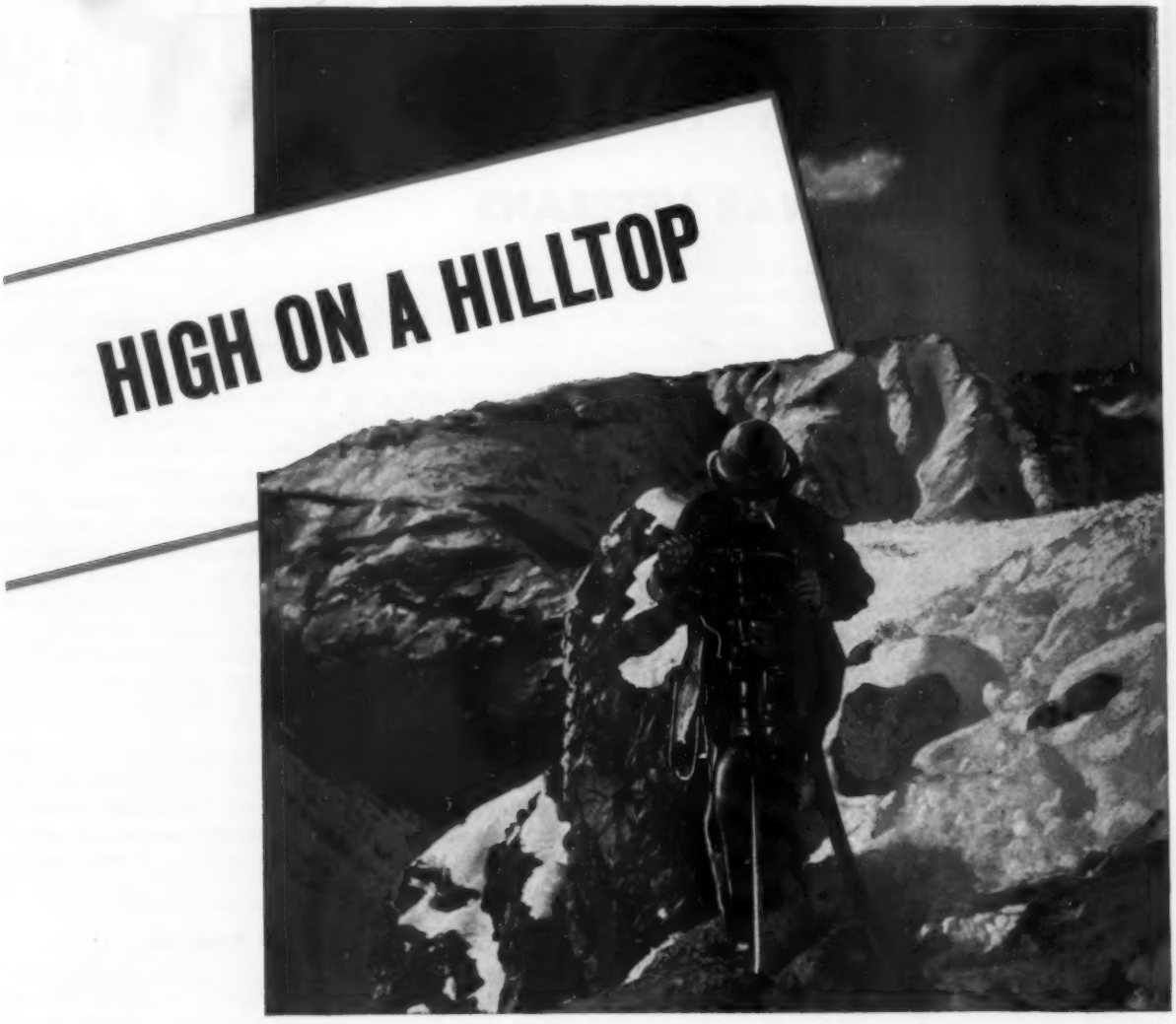
Employing the Disabled

Industry is not obligated to re-employ disabled veterans but many leading industrial concerns already have rehabilitation programs in work. Many of the jobs in the rock products industries are hazardous, to be sure, but there are many that could be filled by handicapped persons provided the individual companies will assume the initiative to properly fit the employe to the job in each instance.

We wish to call attention to a booklet, "A Plan to Help You Employ Disabled Veterans and Other Handicapped Persons Productively and Safely," distributed by American Mutual Alliance, Chicago, that could be read to advantage by employers desiring to give disabled veterans an opportunity to make an honest living.

It sets forth a practical plan for placing handicapped persons on jobs with safety to themselves and with benefit to all on the premise that physically handicapped persons are employable and that their employment is consistent with sound insurance principles. Basically, the plan involves job analysis and fitting the veteran to his job.

Bror Nordberg



FROM jackhammers on mountain tops ... to stopers in mines ... through a thousand-and-one-jobs between ... industry is using compressed air in an ever-increasing number of ways.

Whatever the job for "air power", efficient, trouble-free compressor operation is essential. To secure it, experienced compressor operators lubricate with Texaco.

Texaco Alcaid, Algol or *Ursa Oils* assure wide-opening, tight-closing valves, free piston rings, open ports, clear lines, continuous air supply. Their use in air compressors is nationwide. They also assure maximum service life between overhauls, fewer repairs and replacements.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States.

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ *More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.*

★ *More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.*

★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

★ *More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.*

★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

TEXACO

REG. T.M.

TEXACO Lubricants

FOR ALL AIR COMPRESSORS AND TOOLS

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

★ ★ ★ Washington NEWS

BOARDS OF REVIEW in the Office of Price Administration have been created that will consider protests to maximum price regulations and orders and make recommendations to Price Administrator Chester Bowles concerning the protests.

Establishment of these boards of review is required under the Stabilization Extension Act, which provides that a person filing a protest after September 1, 1944, may have his objections considered by such a board before denial of the protest in whole or in part.

In announcing the methods by which these boards will be set up and will operate, Mr. Bowles said:

"When a protestant requests it, these new boards will fully consider all information presented and will also hear oral argument supporting the protest where that is requested. I believe that this will help us in handling protests and will assure that our final decisions will be based on thorough knowledge of all the facts."

Details of the boards' appointment and procedure in handling protests are contained in amendments to Revised Procedural Regulations Nos. 1 and 3, which regulate the protest procedure in price and rent matters, respectively.

Important points covered by the amendments include these:

The personnel of the boards will be appointed in individual cases from the officers and employes of O.P.A. and the protestant will be informed of the member or members to consider his protest. Where more than one person is appointed on a board, one member will ordinarily be a person who is directly responsible for the formulation or administration of the regulation or order being protested.

The protestant may request oral hearing either in Washington, D. C., or at some other location more convenient to him. Hearings by a board consisting of more than one person will ordinarily be in Washington, D. C. Hearings at some other location will ordinarily be before a subcommittee consisting of one member of the board. The protestant is to be notified of all details in this connection in ample time to allow him to present his argument.

Clarify Fluorspar Order

The Mica-Graphite Division of W. P.B. recently issued a statement to clarify the situation relative to the purchase and sale of metallurgical fluorspar. Discontinuance of the restricted shipping plan on August 12, the statement said, in no way indicates that efforts toward increasing production of metallurgical grade fluorspar should be relaxed. The market for metallurgical grade fluorspar is firm and acid grade is in urgent demand. The shipping plan discontinued August 12 placed restrictions on consumers' inventories and prohibited the receipt of further shipments when a consumer's holdings exceeded the industry average. Such measures, according to W.P.B., are no longer deemed necessary.

O.P.A. Makes More Cement Price Increases

On September 14, the O.P.A. announced that, effective October 14, the price of cement could be increased by 20c per barrel in Arizona, that part of California south of and including the counties of Santa Barbara, Kern, Inyo and Mono, and the counties of Clark and Lincoln in Nevada. This is amendment 8 to MPR No. 224.

The higher ceiling applies only to sales made f.o.b. mills situated within the area mentioned and to sales made on a delivered basis to a destination within the same area. Cements affected are all types of portland cement (except white cement) and masonry cement and other special types such as natural cement, alumina cement and slag lime cement.

The increase may be passed on by persons who resell cement in the same form in which they purchased it.

The 20-cent increase was allowed, O.P.A. explained, because data submitted by producers in the area mentioned indicated that earnings under present ceilings have declined and that higher manufacturers' ceilings are needed to bring industry earnings to the level of those averaged during the peacetime years from 1936 to 1939, inclusive.

No permission is given to pass on the increase in resales of ready-mixed concrete, concrete products or other products manufactured from cement, since various manufacturers of these products will be affected by the increase in varying degrees. It is provided, however, that sellers of these manufactured products who can demonstrate a need for higher ceiling prices under existing adjustment provisions may make application to the San Francisco Regional Office of O.P.A. The 30-day period between the issuance and effective date of the cement action will provide sufficient time for the sellers of manufactured products to present their case to the field office.

Executive Secretary V. P. Ahearn of the National Ready Mixed Concrete Association has reported that the industry is taking proper action to present a strong case before the O.P.A. to permit producers to pass on the increase in prices to consumers. A meeting of producers was called on September 14 by Robert Mitchell, president of Consolidated Rock Products Co., Los Angeles, Calif., at which 90 percent of the producers in the area were represented, to map out a course of action.

Cement Increase Passed on to Consumer

Under Amendment 47 to Order A-1, MPR 224, the O.P.A. has authorized ready mixed concrete producers, effective August 30, to pass along the increased price of cement growing out of Amendment 7 to MPR 224. This authorization applies to producers in the entire States of Ohio, West Virginia and Michigan; that portion of Pennsylvania west of the Counties of Potter, Clinton, Center, Huntington and Franklin; that portion of Virginia west of and including the Counties of Tazewell, Smyth and Washington; that portion of Kentucky east of and including the Counties of Boone, Grant, Harrison, Bourbon, Clark, Estill, Jackson, Clay, Knox and Ball.

The National Ready Mixed Concrete Association has been advised by O.P.A. that on the basis of field studies of the ready mixed concrete industry made in the Northeastern Area it was clear that ready mixed concrete producers in the area indicated above were unable to absorb the increased cost of cement. For that reason it was decided to give relief to the ready mixed concrete industry simultaneously with the authority to the cement industry to increase cement prices in the area by 10 cents per barrel.

Remove Vault Steel Restrictions

RESTRICTIONS on the gauge of wire and size of openings in reinforcing mesh for concrete burial vaults have been removed, and the permitted tin content of solder for metal liners used in wooden caskets to provide hermetical sealing, has been in-

(Continued on page 122)

Plant of the ITOGON MINING CO. at Sangilo in the Philippines which was under the general management of MARSMAN & COMPANY, INC. of Manila between 1925 and Dec. 23, 1941 when the plant was abandoned on the invasion of the Philippines by the Japanese. This mine produced $17,500,000 in gold and silver. The plant high in the mountains (4000 feet) was up to date in every particular—comfortable housing for its thousand employees, theatre, hospital, and equipped with modern machinery. This plant was supplied with grinding balls made by the American Forge Co.

. . . and the ore will again be crushed by . . .

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For years we have supplied the Marsman** mining properties (Itogon, San Mauricio, United Paracale, Suyoc Consolidated) with Grinding Balls. It is one of our specialties—for mining and cement operations. By our Rolforged process, the grain structure and fibre flow are concentrated to give super strength—then the balls are heat treated to give maximum hardness. "AMERICAN" Grinding Balls are doing a fine job in many parts of the world We make them from **Electric Furnace Steel** (carbon or alloy), from 3/4 inch to 6 inches in diameter. Let us know your requirements and we will gladly quote prices.

** The day is not far distant when we will again supply the Marsman mining properties and the Marsman Trading Corporation.

AMERICAN FORGE COMPANY
BERKELEY, CALIFORNIA

SINCE 1888

Granular Sub-Bases for Pavements

LAST FEBRUARY I attended the First Illinois State Asphalt Conference, at Springfield. Recently a copy of the entire proceedings has been received. At the time of the meeting, and even more so now, we saw in this the opening skirmish, in what will probably be the most extensive and intensive battle of competitive highway material interests ever staged.

The issue is somewhat different now than it was 25 years ago when a huge post-war highway building program also was in prospect. In most parts of the country, at that time, we were starting from scratch. We wanted hard-surfaced roads as fast as possible and on the largest mileage possible. In the Northeast and in Ohio where highway departments had had considerable experience with macadam-type pavements, asphalt interests generally had the upper hand. On Mid-West mud roads portland cement concrete pavements appeared to be the ideal solution.

Repaving the Issue

Now the issue is repaving thousands of miles of these early concrete pavements. Probably most of them have served well and as long as was to be expected in view of the greatly changed traffic loads. Unfortunately, however, a great many miles of these concrete pavement were laid directly on mud, with no adequate provision for subdrainage. Their disintegration was caused quite as much by this lack of foresight in design as by heavier traffic.

The problem facing highway engineers and highway departments is this: Shall these old pavements be scrapped and torn up, or shall they be used as bases for new pavement surfaces? The asphalt interests have begun an active campaign to use these old concrete pavements as bases for new asphalt surfacing—and they appear to have a lot of support from highway engineers. Any engineer hates the idea of scrapping something that may still have usefulness. The asphalt interests say the more broken up the present concrete slabs, the better foundation they make for asphalt resurfacing!

Obviously, covering over broken concrete slabs laid on mud with 2 or 3 in. of new asphalt mixture will not cure the defects in drainage which were the prime cause of the pavement failure. At most it will be only a temporary expedient. Undoubtedly there are many miles of pavement where such temporary expediency is justified. But it must not be lost sight of, that if first class pavements of any type are to be newly built, the construction of granular sub-bases and other provision for sub-surface drainage are more important than the kind of new surface pavement.

California Experiments Recalled

In our Notes in the April, 1944, issue we called attention to some early experiments (1922) to stabilize heavy clay soils for pavement bases in California. In our recent visit to California we found producers were not familiar with these or the conclusions which were drawn from them, so a letter to T. E. STANTON, Materials and Research Engineer, Division of Highways, Department of Public Works, California, produced the following interesting facts:

"Answering your inquiry of September 8, 1944, regarding the early subgrade treatments on the Denverton-Rio Vista Highway in Solano County, Calif., constructed in 1921-22, the following conclusions were reached within two or three years after the work was done:

"(1) A 4-in. untreated gravel layer under the 5-in. thick reinforced concrete base was found superior to any of the subgrade stabilization treatments, even though the 4-in. gravel base was not sufficient to prevent subsequent premature distress.

"(2) There was some improvement from the use of the admixtures but the improvement was slight and did not justify the added expense. The layer of gravel was much less expensive and more efficient.

"California has had no occasion to modify the conclusions based on the Solano County tests.

"However, in fairness to soil stabilization treatments it should be understood that the Solano County tests were not entirely comparable with modern practice. The soil was a very bad California adobe of high swell and shrinkage characteristics. The treatments consisted of:

(*a*) 1:10 Portland cement mixture
(*b*) 1:20 Portland cement mixture
(*c*) 1:20 Hydrated lime mixture
(*d*) 1:20 Limestone dust mixture
(*e*) SC-2 Asphaltic road oil

"It will be noted that a somewhat lower percentage of admixture was used than under current practice with this type of soil.

"It is not our standard practice to stabilize low bearing value high swell soils for subgrades but rather to import good bearing value, low swell materials of a granular nature.

"The above remarks apply to subgrades under pavement bases five inches or more in thickness.

"We do frequently treat granular good bearing value materials with portland cement or road oils, and cutbacks when a two or three-inch bituminous surface will serve the traffic, and California has many hundreds of miles of portland cement and bituminous treated bases of this nature which are giving excellent service. Our local designation of such bases is 'Cement' or 'Bituminous' treated bases.

"The above comments do not mean that we would not treat a local low grade soil under any conditions, but only that where good bearing value, low swell materials are economically available it is not believed that there is any economy in attempting to stabilize a low grade soil with some expensive admixture. There are very few places in California where a good grade of subgrade material is not available within a reasonable haul. We would have no hesitation, however, in treating a local soil with portland cement or other admixture if a better grade of subgrade material was not readily and economically available and laboratory tests indicated that the soil treatment would be successful."

From which we conclude that our arguments during several months past to promote the use of granular sub-bases are well founded. We know of at least one producer who has already worked out a special sub-base road mix. It is composed essentially of screenings and torpedo gravel, with enough fines to give it stability, but also open enough to permit drainage and prevent capillary.

Nathan C. Rockwood

Stockpiling

Labor saving equipment is of the utmost necessity now and in the immediate months to come. To meet this need, WPB has released a limited schedule of Barber-Greene Model 82-A Bucket Loaders and Wheel Mounted and Permanent Belt Conveyors.

Preparation of aggregate and stock piling sized material is greatly facilitated with Barber-Greene Permanent and Portable Belt Conveyors. Reclaiming from stock piles is speeded up using the high capacity Model 82-A Bucket Loader, requiring less idle truck time. Often truck drivers easily fill in as loader operators loading their own trucks.

Barber-Greene engineers can assist you in utilizing your present equipment to its fullest advantage, as well as suggesting new equipment if it is necessary. Write to Sales Engineering Department, Barber-Greene Company, Aurora, Illinois, U.S.A.

44-34

BARBER-GREENE

AURORA, ILL.

News ABOUT THE INDUSTRY AND PEOPLE

Resigns

R. E. TREMOUREAUX, general manager of the United States Lime Products Corp., San Francisco, Calif., has resigned but will remain with the company as a consultant and will be available for outside consulting and engineering work. At the same time the old "Atlas Mortar" group sold their controlling interest in the lime business in 1922 with the late Chas. M. Cadman, and was associated with Mr. Cadman in the rock, sand, gravel and concrete business in addition to lime manufacturing. KENNEDY ELLSWORTH becomes executive vice-president and general manager with headquarters in Los Angeles, and CARROLL STEPHENS is the vice-president in charge of northern California under Mr. Ellsworth. STANLEY ARNOT and L. N. GRINDELL remain in charge of the operations at Sonora, Calif., and Sloan, Nev., respectively. All of the above executives have been associated with Mr. Tremoureaux and the company for many years.

Talc President

A. PRESCOTT LOOMIS has been named president and treasurer of W. H. Loomis Talc Corp., Gouverneur, N. Y., succeeding the late Willis H. Loomis. R. Frank Atkinson has been made vice-president; Joseph A. Baumert, secretary; Margaret L. Storie, assistant secretary and assistant treasurer; Emil E. Esckilsen, sales manager; Nelson B. Winters, production manager; and Orton Smalley, chemist. The current board of directors consists of A. Prescott Loomis, Charles M. Tait, Harold R. German, Charles B. Roberts, Edward Jennings, Charles K. Walton, Mrs. Willis H. Loomis, Dr. Stanley W. Sayer and Joseph A. Baumert.

General Superintendent

MELVIN C. DOW, chief engineer, New York Trap Rock Corp., New York, N. Y., has been appointed general superintendent, succeeding Joseph Q. Taylor. Mr. Dow is co-author of the series of articles on "Practical Operation of Conveyor Belts" which has been published in ROCK PRODUCTS.

Magnesium Director

PERRY D. HELSER, formerly chief of the magnesium branch of the War Production Board in Washington, D. C., has been selected as secretary-director of the newly organized Magnesium Association, with headquarters at 30 Rockefeller Plaza, New York, N. Y.

John H. Shroyer

Association Speaker

JOHN H. SHROYER, secretary, Pennsylvania State Highway Department, Harrisburg, Penn., was a recent featured speaker before the annual meeting and outing of the Pennsylvania Stone Producers Association.

On Radio Show

ERNEST E. DUQUE, president of the California Portland Cement Co., Los Angeles, Calif., was guest speaker on "Everybody's Hour" radio show, sponsored by the *Los Angeles Times*, as a salute to workers in Southern California's cement industry. A native of California, graduate of Los Angeles High School and the University of California at Berkeley, Mr. Duque in 1915 joined the firm which he has headed since 1939. Prior to becoming president he served in sales, purchasing and managerial capacity. Mr. Duque is also a director of the Blue Diamond Corp.

Becomes General Manager

A. EDWARD HEINS, formerly manager of the Eau Claire, Wis., office of the War Production Board, has accepted a position as general manager with the Neuheisel Lime & Gravel Co. of Eau Claire, and will make his headquarters in the new office of the company at 1330 Menomonie St.

Heads New Office

J. R. BANNING has been made manager of the new office recently opened by The Asphalt Institute of America in Billings, Mont., to serve Washington, Idaho, Utah, Montana, Wyoming, North Dakota and South Dakota.

Mine Superintendent

J. L. WEAVER, formerly representative in Arizona for the American Cyanamid Co., and later superintendent of mines for the Phosphate Mining Co., Nichols, Fla., has returned to American Cyanamid as superintendent of mines at Brewster, Fla.

Celebrate Plant Opening

GEORGE F. PETTINOS, INC., Philadelphia, Penn., celebrated the opening of its new silica plant at Manumuskin, N. J., on September 14. On the occasion of this celebration three generations of the Pettinos family were present along with employes and supervisory officials from the main office. In the accompanying photograph may be seen George F. Pettinos, Sr., George F. Pettinos, Jr., and his two sons. Another photograph (page 54) shows Mr. and Mrs. George F. Pettinos, Sr., and Mr. and Mrs. George F. Pettinos, Jr.

Three generations of the Pettinos family. From right to left, Geo. F. Pettinos, Sr., Geo. F. Pettinos, Jr., and his two sons

Left to right, Mr. and Mrs. Geo. F. Pettinos, Jr., and Mr. and Mrs. Geo. F. Pettinos, Sr.

Group of George F. Pettinos, Inc., officials at the plant opening celebration. Left to right, Ernest Pineau, engineer; John Camm, superintendent, Penbryn, N. J., plant, and George Guiles, superintendent at the new Manumuskin, N. J., plant

and his two sons. Another photograph shows Mr. and Mrs. George F. Pettinos, Sr., and Mr. and Mrs. George F. Pettinos, Jr.

Labor Regional Director

HAROLD G. MAY, formerly in charge of wage analysis and job classification activities of the Labor Relations Institute, has been appointed regional director of the management engineering division of the Institute for the states of Michigan and Ohio. This announcement was made by O. C. Cool, national director. Mr. May will make his headquarters in the Donovan Building, 2457 Woodward Ave., Detroit, Mich.

Resumes Association Work

MAJOR C. STEWART COMEAUX, recently assistant deputy chief of the field service branch of the Ordnance Department, Army Service Forces, has returned to civilian life and again taken up his former positions as secretary-treasurer of the Institute of Makers of Explosives and the Sporting Arms and Ammunition Manufacturers' Institute.

Soldier for a Day

H. M. KRABBE, engineer, Olympic Portland Cement Co., Bellingham, Wash., recently spent 48 hours at Fort Lewis being a "soldier for a day." Together with a number of labor leaders and business executives of the state, Mr. Krabbe tried soldiering at the fort. Although the first day's round of activities did not end until 2:30 a.m., they were routed out at 5:30 a.m. for the second day's round of military experiences. As one of the soldiers for a day put it: "I'll be as good as ever in six weeks."

Transferred

A. H. YWARSKY, formerly engaged in the sand and gravel business in Port Townsend, Wash., but with the United States Engineers for the last year and a half, has been transferred to the procurement service of the United States government as property field officer. Mr. Ywarsky will make his headquarters at the Mount Rainier Ordnance Depot, Tacoma, Wash., and will cover the states of Washington, Oregon, Idaho and Montana.

Phosphate Manager

EUGENE CARTER ANDERSON, former chief for International Minerals and Chemical Corp. at Carlsbad, N. M., and lately connected with fluorspar activities of the company at Gila, has been transferred to the phosphate division as manager of the new Montana operations.

Manages W.P.B. Division

C. A. WILLSON, a recognized authority on concrete and the construction industry, has been placed in charge of the newly created Clay and Concrete Products Division of the War Production Board. Mr. Willson has taken an active part in work of the American Concrete Institute and is a member of Committee C-15, Units of Manufactured Masonry, of the American Society for Testing Materials. MYRON HULTMARK will be assistant to Mr. Willson in charge of the concrete products section of this new division.

Awarded Medal

CHESTER A. FULTON, president of the American Institute of Mining and Metallurgical Engineers, has been awarded the Columbia University Medal for Excellence as the "most effective administrator and research worker in his chosen field."

C. of C. Committee

G. F. COOPE, president, Potash Company of America, Carlsbad, N. M., is a member of the Natural Resources Department Committee of the United States Chamber of Commerce for 1944-45.

Technical Assistant

HUBERT O. DEBECK, who has been district manager and field engineer for Colonial Mica Corp. at Custer, S. D., is now technical assistant to the president in the company's New York office.

Heads C.E.D. Committee

W. G. PERROW, district manager for the Lehigh Portland Cement Co., Spokane, Wash., is chairman of the Spokane county committee of the Committee for Economic Development.

Increase Stone Production

WESTERN OHIO STONE CO., Lima, Ohio, which recently purchased the American Stone Co., plans to make changes to this plant during the winter which will permit an increase in production of crushed limestone. A 3-ft. Symons cone crusher has been purchased, and the large gyratory crusher will be moved to another location in the plant. New screens also will be added. The American Stone Co. plant has a production capacity at present of 500 tons a day which will be increased with the addition of new equipment. C. V. Wolfe is president; J. H. Shroyer is vice-president and general manager; and J. R. Newell is secretary and treasurer of the Western Ohio Stone Co.

British Dolomite Refractory

IN GREAT BRITAIN, refractory dolomite is stabilized by calcining it with serpentine, where the lime is converted to stable tri-calcium silicate. This procedure differs from American practice, by which the lime is converted to dicalcium silicate with addition of stabilizing iron oxide. The American product softens at a lower temperature than the British on account of its content of the low-melting calcium ferrites, but this is no drawback for maintenance use. In Britain, however, much stabilized dolomite must be sufficiently refractory for brickmaking; hence formulas are used which require as little stabilizer as possible, states a Bureau of Mines report.

Start Agstone Plant

NEUHEISEL LIME AND GRAVEL CO., Eau Claire, Wis., has started operating an agricultural limestone plant two miles south of Durand. The plant, which will produce about 400 tons of agricultural limestone a day, will be in charge of Ray Frederick. This property was built on the site of an old quarry which had been abandoned for many years. The Neuheisel company also own plants at Mondovi and Arcadia.

Made Vice-Presidents

E. W. HIGHTOWER and J. W. CHAPPELL have been made vice-presidents of the Georgia Marble Co., Atlanta, Ga. They have been associated with the company for many years.

Assistant Comptrollers

R. W. MOTHERSHED, chief warehouse auditor of the Pittsburgh Plate Glass Company, Pittsburgh, Penn., and A. W. SMILEY, general auditor, have been appointed assistant comptrollers of the company.

Uprooted tree on top of automobile at Millville, N. J. Picture taken after the East coast hurricane. The new Pettinos plant at Manumuskin, N. J., is near Millville but withstood the windstorm without damage

Cement Production

BUREAU OF MINES reports that production of finished portland cement during July, 1944, totaled 8,516,000 bbl. or 28 percent below production in July, 1943. This monthly rate of decline was less severe than the 34 percent rate noted in June and was much less than the maximum rate—50 percent in January, 1944—reached since the downtrend started in February, 1943. Mill shipments during July, 1944 totaled 9,283,000 bbl. or 25 percent lower than in July, 1943. Producers continued to reduce their stocks of emergency-specification cement. During July, stocks declined 767,000 bbl. to an end-of-month total of 20,241,000 bbl. which was 6 percent below the quantity on hand on July 31, 1943.

The following statement gives the relation of production to capacity, and is compared with the estimated capacity at the close of July, 1944, and of July, 1943:

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	July 1943	July 1944	June 1944	May 1944	Apr. 1944
The month	56.0	41.0	40.0	35.0	32.0
12 months	67.0	41.0	43.0	44.0	46.0

War Homes for Chicago

WILLIAM K. DIVERS, regional representative of the National Housing Agency, has announced a program to provide 3500 additional living units for war workers in the Chicago area. Priorities are being made available for the construction of 2100 privately financed homes for workers employed at factories in the southwest section of the city, and another 900 priorities will be issued for new housing intended primarily for families of Negro war workers. Mr. Divers said that the next housing allotment for metropolitan Chicago will be based on standards of the so-called H-2 program, which is not limited to in-migrant workers but is authorized to relieve areas congested as a result of the war. He anticipates that H-2 housing will be authorized for the northwest side during the coming winter.

Spokane Construction Council

TO PROMOTE post-war business in the construction industry, the Spokane Construction Council was organized recently with 30 representatives in attendance. W. G. Perrow, district manager of the Lehigh Portland Cement Co., was named temporary president, and Howard H. Mansur, production manager of the Washington Brick and Lime Co., was appointed temporary secretary. Mr. Perrow said that 300 firms in Spokane could qualify for membership.

Will Install Crusher

ROCKFORD STONE CO., Rockford, Ohio, plans to install a 2-ft. Symons crusher next to a similar crusher in its limestone plant. A Wheeling jaw crusher will be moved from the crushing and screening plant to the quarry floor for primary crushing. A belt conveyor system for transporting stone from the quarry to the plant will replace the cable hoist-car system now used.

Sell Gravel Concern

LUTESVILLE SAND & GRAVEL CO., Cape Girardeau, Mo., recently sold its Grant Parish plant to the La Salle Material Co., Bossier City, La. The Lutesville company has operated at this location since 1931. Paul Lutes will remain with the new company.

Plan Arizona Cement Mill

ARIZONA PORTLAND CEMENT CO. is the name of a new cement company which was recently organized to construct a $1,000,000 plant near Tucson, Ariz. A mill will be erected near Rillito along the Southern Pacific Railroad and on the Tucson-Phoenix highway. It will have an initial capacity of between 300,000 and 400,000 bbls. of cement annually. Limestone deposits are ample for many years of operation. It is planned to supply Arizona with cement and also serve part of New Mexico. Offices will be located in Tucson. E. E. Duque will be president; L. E. Bancroft, vice-president, secretary and treasurer; and Ralph W. Bilby, assistant secretary and assistant treasurer. Mr. Duque is president of California Portland Cement Co., and Mr. Bancroft is vice-president and manager of the California company whose offices are in Los Angeles and with plant at Colton, Calif.

Cement Regional Meetings

REGIONAL meetings of the Portland Cement Association committees on Technical Problems and Manufacturing Research were held recently in Bethlehem, Penn. Myron A. Swayze, director of research of the Lone Star Cement Corporation, was chairman of the Technical Committee and Henry P. Reid, assistant to the president of the Universal Atlas cement Co., was chairman of the Manufacturing Research Committee. Guests were taken through the new Northampton plant of Universal Atlas. During the meeting, F. R. McMillan, director of research of the Portland Cement Association, presented reports on technical work done by the association during the past year.

Buys Silica Deposit

THE LA RUE SILICA CORPORATION, Milwaukee, Wis., has acquired the silica sand deposit near North Freedom, Wis. The product is said to be 99.81 percent pure silica sand suitable for making glass, sand blasting, plastic paints, chicken grit and concrete aggregate.

Move Ready Mix Plant

THE ARMBRUST READY-MIX CONCRETE CO., plant at Washington Court House, Ohio, is being moved from the former Baker Wood Preserving Co., property to a tract along the Detroit, Toledo & Ironton Railroad to permit expansion.

Buy Block Concern

MILBANK CEMENT PRODUCTS CO., Milbank, S. Dak., is the new name of the concrete masonry unit business formerly conducted by Albert Johnson. Ronald Splinter, who has been operating the plant, will continue in charge and is one of the new owners. Herb Meyers, the other owner, operates the Milbank Produce Company. It is planned to construct a new plant, and increase production.

CONVENTIONS COMING

American Institute of Mining and Metallurgical Engineers, Annual Meeting, Pennsylvania Hotel, New York, N. Y., February 18-22, 1945.

Highway Research Board, National Research Council, Annual Meeting, Netherland Plaza Hotel, Cincinnati, Ohio, November 22-25, 1944.

National Chemical Exposition and National Industrial Chemical Conference, Chicago Coliseum, Chicago, Ill., November 15-19, 1944.

National Exposition of Power and Mechanical Engineering, Madison Square Garden, New York, N. Y., November 27 to December 2, 1944.

National Industrial Sand Association, Meeting, Palmer House, Chicago, Ill., November 19, 1944.

National Ready Mixed Concrete Association, Annual Meeting, Hotel New Yorker, New York, N. Y., January 24-26, 1945.

National Sand and Gravel Association, Annual Meeting, Hotel New Yorker, New York, N. Y., January 23-25, 1945.

Pavement Yardage

AWARDS of concrete pavement for August, 1944, have been announced by the Portland Cement Association as follows:

	Square Yards Awarded During August, 1944
Roads	1,123,935
Streets and Alleys	642,498
Airports	836,946
Total	2,603,379

Crushed Stone Contracts

CONTRACTS for crushing and delivering 46,485 cu. yds. of crushed stone in Iowa County, Wis., at a cost of about $64,000, were let recently to Stewart Watson, Barneveld, Wis. He also was the successful bidder on furnishing 8680 cu. yds. of rock to county trunk H north of Ridgeway for $1.44 per cu. yd., and Ernest Jenkins of Cobb will furnish 7700 cu. yds. of rock at $1.44 for county trunk A and other roads in the town of Mifflin. R. C. Wonn, Cobb, will furnish 8685 cu. yds. of rock at $1.25 per cu. yd. to county trunk E between Livingston and Mifflin. G. W. Wenfall Watson, Barneveld, will furnish 3520 cu. yds. to county trunk F at $1.42 per cu. yd. Watson will also furnish 7900 cu. yds. of rock to county trunk K south of Barneveld for $1.37 per cu. yd.

Colorado Mica

WESTERN STATES MINING CO. is operating a mica mine at Floyd Hill near Idaho Springs, Colo., which is said to be the largest and most valuable in the United States. Frank Witt, consulting engineer of the company, has advised that a mica trimming plant will be installed at Idaho Springs. At present the mine is being worked only on a limited scale. There is a small portable compressor at the Floyd Hill mine, and a crew of six men are mining the mica and bringing it to Idaho Springs for grading and drying. It is planned to install more machinery in the near future.

End Quarry Strike

STRIKES which have kept 10 Kansas City quarries closed for more than three weeks were ended when the men returned to work September 11. The War Labor Board ordered the men back to work and threatened to withdraw union security and other union privileges. The men asked for an increase of 17 cents an hour, but the Board held that this increase would be out of line with wages paid for similar work in other regions.

Don't burn paper

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Sand Recovery

Aim for the Mean of Specifications

By NATHAN C. ROCKWOOD

IN THE INSTALLMENT on "Sand Recovery" in the July issue, pp. 39, 70 and 72, we promised to tell how the sand gradation shown by the full black line in the accompanying chart (Fig. 2) was obtained by processing the raw sand illustrated on the same chart by the dotted black line. (Incidentally, the tinted red area of the chart Fig. 2, which enclosed the specification limits, as published in the July issue was not properly registered. The reproduction herewith is better.)

Before we describe the actual processing, however, it should be made clear that there is a more direct approch to the problem than the random "cut-and-try" process we illustrated in the July issue. It also is to be remembered that processes for carrying out in the plant the making of changes in sand size percentages, which our figures and charts show must be made to fit specifications, can never be an exact proceeding. There must be a lot of experimenting, or cut-and-try, in any plant processing; and probably, most operators had rather experiment than calculate. This means, too, that the plant setup should be elastic enough to permit changes, so that experimenting is possible. The sand that was originally produced, and which we refer to as the raw material, had the following sieve analysis (as plotted in Fig. 2):

PERCENT PASSING—		PERCENT RETAINED	
100-mesh	0.5	4-mesh	0.0
50-mesh	5.2	8-mesh	3.1
30-mesh	43.6	16-mesh	14.3
16-mesh	85.7	30-mesh	56.4
8-mesh	96.9	50-mesh	94.8
4-mesh	100.0	100-mesh	99.5

A better mental picture of this sand may be obtained, perhaps, from the following figures:

PERCENTAGE OF SIZES	
Minus 100-mesh	0.5
Between 50- and 100-mesh	4.7
Between 30- and 50-mesh	38.4
Between 16- and 30-mesh	42.1
Between 8- and 16-mesh	11.2
Between 4- and 8-mesh	3.1
Plus 4-mesh	0.0
Total	100.0

Both these sets of figures, as well as the chart, Fig. 2, make it evident that there is a surplus, or "belly," in the 16- to 50-mesh sizes, as well as a deficiency in the minus 50- and minus 100-mesh sizes.

In our discussion of the problem in the July issue we purposely played around with these figures, taking out and adding, hypothetically, various arbitrary amounts of different sizes and plotting the resulting curves or charts against the specification requirements. We called this frankly "playing with the charts"; and for two reasons: (1) because we wanted

(Continued from page 96)

FIG. 2

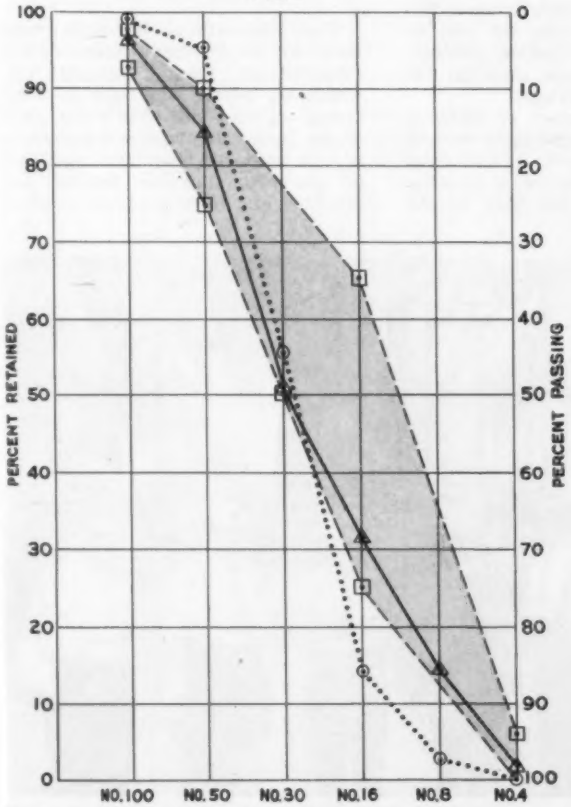


Fig. 2: Dash lines and shaded area show specification limits. Dotted line is raw material. Full line is finished product by sieve tests

FIG. 4

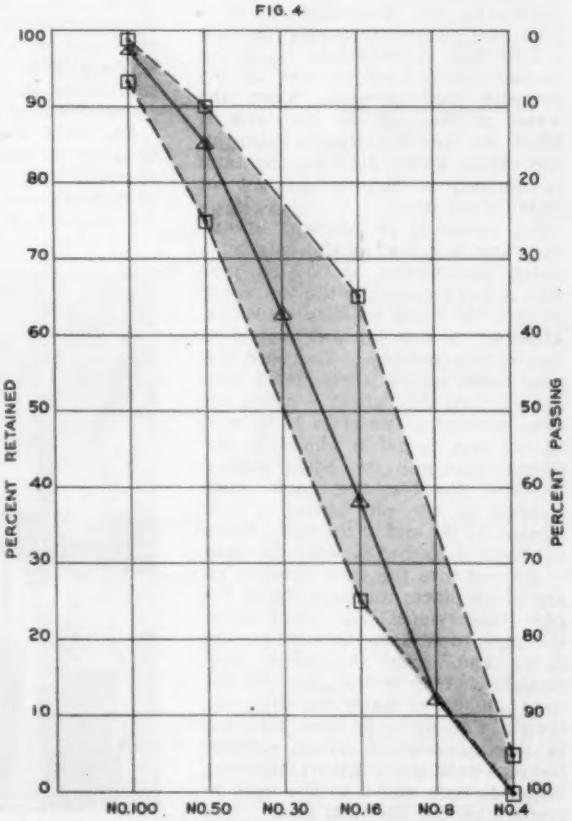


Fig. 4: Dash lines and shaded area show specification limits. Full line is a near mean of specification limits—the product aimed at

HINTS *and* HELPS

Practical Ideas Developed by Operating Men

Water Measuring Device

A SIMPLE and effective method of accurately measuring the amount of water to be added to a concrete mix

Steel rod with holes drilled in at graduated distances regulates amount of water released from tank

is now in use at the Lyman-Ritchey ready mixed concrete plant, Omaha, Neb.

A home made steel water tank, shown in the illustration, is filled from the city water supply through a 2-in. pipe. A surge tank connected to the line is used to take up the pressure that develops when the water is shut off, as the tank is filled. An overflow trough takes off the excess water, allowing the tank to contain a definite amount of water when filled.

Set vertically in the tank at one end, and attached at the base by a swivel attachment, is a 3-in. pipe with a cap fastened to the top which is open to allow passage of water. Attached to this cap and extending horizontally outside of the tank is a steel beam which is graduated with holes drilled through it. When a desired amount of water is to be sent to the mix, a pin is placed in the proper hole and the beam pushed forward towards the tank until stopped by the pin hitting a stop located on the end of the tank. When the beam is pushed forward, the pipe is lowered into the tank through an arc which places the open top of the pipe under water. The water above the pipe then flows through to the mixer and when the water level reaches the top of the pipe, the desired amount of water has been obtained. The beam is then returned to starting position which elevates the pipe back to its original position. Water is then added to the tank in preparation for the next mix.

The automatic shutoff feature of this device assures accurate measurement of the amount of water to be used. It also eliminates the necessity of having the operator watch the water entering the mix to assure the proper amount as no more water can enter when the level reaches the top of the pipe.

The idea for this novel arrangement was originated by John Koop, engineer for the Lyman-Ritchey Sand and Gravel Corp.

Special Dragline Device for High Face

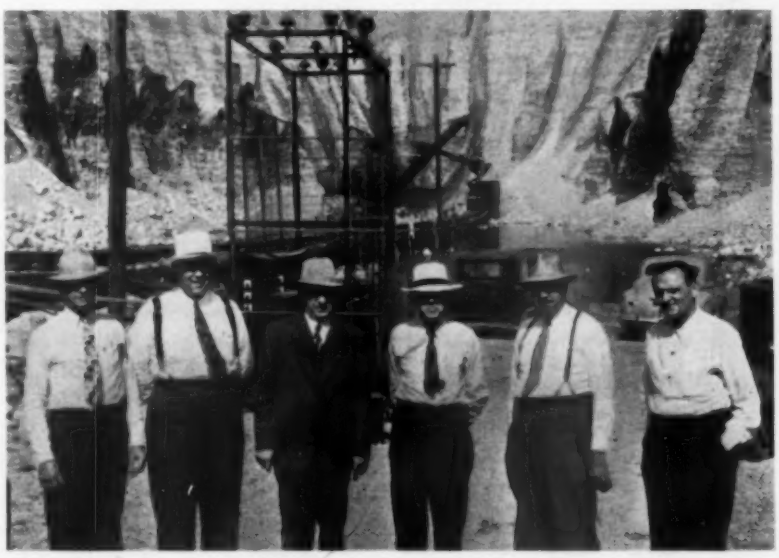
ALTHOUGH the device described here was illustrated in our April, 1944, issue, p. 63, in an article describing some features of the Roscoe plant of the Consolidated Rock Products Co., Los Angeles, Calif., its full significance was not given in that story.

Like all gravel deposits, and especially those with high faces, the pits around Los Angeles have a considerable variety of material, in this case in nearly horizontal layers or strata at various depths. Consequently when excavated at any level, including the lowest, the material sent to the plant for processing may vary considerably from day to day or week to week. For efficiency in processing as well as uniformity in the finished product, uniformity in the raw material fed to the plant is important.

So, while one object of using a dragline on top of the bank with a specially built scraper, in the form of a double-sided harrow, is to bring the material down for feed to the shovel, preventing the shovel going in so far as to cause caving, another object is to provide a shovel feed of well-mixed, or well balanced, raw material from the entire vertical cross-section of the pit.

Irwindale pit of Consolidated Rock Products Co., showing dragline on top with double-harrow (teeth on both sides) for scarifying down shovel feed

The illustrations herewith were made at the Irwindale plant of the Consolidated Rock Products Co., which we believe was built by John Gregg. At least this idea is his. Also, at the Irwindale plant, is a surge pile of raw material over the feed end of the belt conveyor feeding the crushing and feeding plant—another



Distinguished visitors at Irwindale. Left to right, Harry D. Jumper, John Gregg, Ed. J. Goodpaster, Ronald C. Griffin, Robt. Mitchell, V. P. Ahearn

device for insuring uniformity in the material as well as uniformity in the quantity fed to the processing machinery.

Remote Controlled Mine Doors

By JOHN F. PRUYN

MINE HAULAGE can be speeded up by a better proportioning of cars and locomotives, better dispatching systems, faster coupling and switching, better maintenance, and reduction of stops for ventilating doors, etc.

In the illustration are shown sketches of simple rigs for remote control of mine doors. They require no "priority" motors, but they speed up haulage throughout a mine. They serve the purpose until the day that fully automatic doors can be installed.

The sketches show both single and double door rigs. To illustrate the general system, the pulleys are not spotted in their exact operating positions. Wire or rope may be used in all cases. Friction stops should be used on all doors to keep them open while a load is passing, but none have been shown on the sketches.

Door opening ropes may be spotted 100 ft. or more behind the door for locomotives that push their empty cars ahead of them. The control ropes may be mounted across the drift, at the side, or arranged to be tripped by the train itself. Motormen soon learn to operate these doors without stopping completely. Small "man-doors," not shown, can be cut in all these doors with little trouble. However, a cut around the post closed by a "man-door" often has proved better.

Sieve Analysis Machine

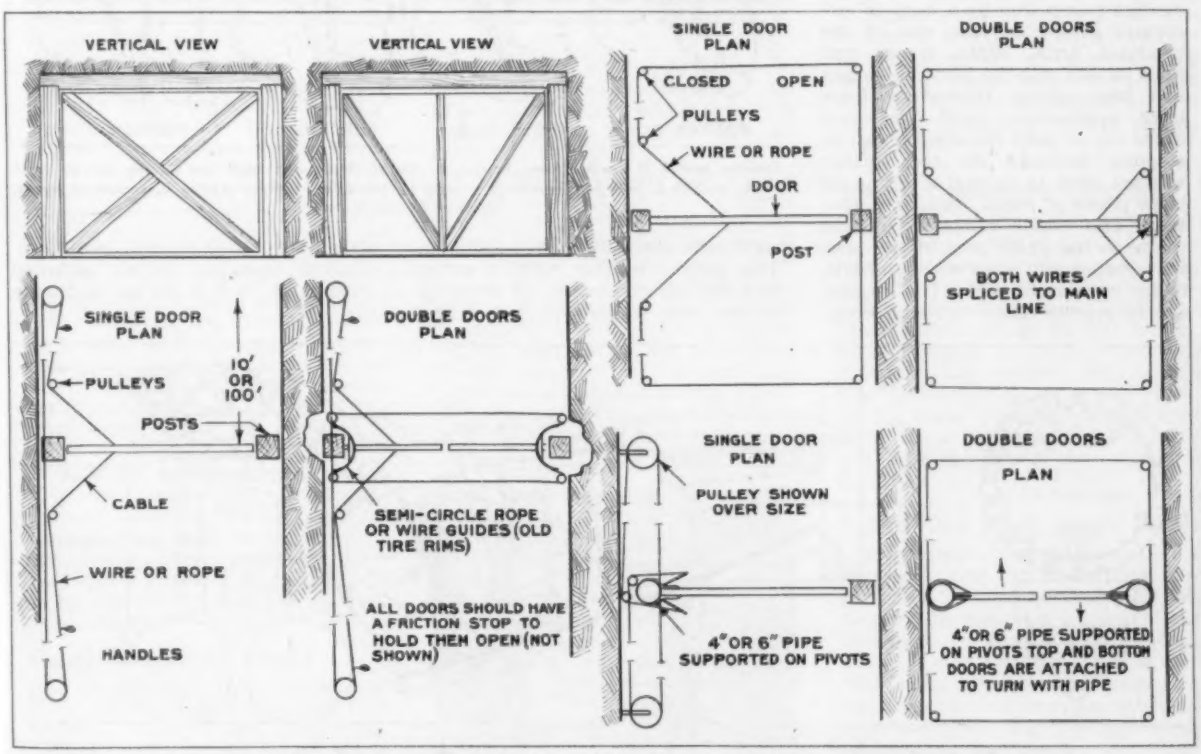
DUE TO THE LABOR SHORTAGE, the Lincoln Sand and Gravel Co., Lincoln, Ill., has been making sieve analyses of their material for the State of Illinois Highway Dept., since this department has been unable to keep an engineer at the plant for that purpose. Since this required time and necessitated taking a man away from his regular work, a novel idea was put into effect for making sieve analyses by machine.

A rectangular frame was constructed of angle irons and legs were welded on for support using the same material. A smaller frame was supported directly above the subframe by means of springs, which allows the upper frame to vibrate without transferring any motion to the lower frame. A steel plate was fastened on the upper frame by means of angle iron supports. On this plate, a circular steel ring was welded, having the same diameter as the standard sieve. The bottom sieve is placed in this ring and the other sieves are placed one on top of the other, and clamped in place

Off-center vibrator for making sieve analyses of sand and gravel

by means of steel rods which are connected to the table at the bottom and which lock into the slots of a steel bar placed on top of the top sieve.

A ¼-hp. motor, running at 1750 r.p.m., drives a shaft with an offset center counterbalance, which is connected to the two ends of the upper frame. When the motor is run, the offset center shaft produces a vibrating motion to the upper frame which in turn vibrates the sieves. In this manner, five sieves can be used simultaneously, saving time as well as labor.



Details of remote-controlled mine doors. Both single and double-door types are shown

NEW *Machinery*

One-Unit Crushing and Screening Plant

BARBER-GREENE Co., Aurora, Ill., has announced as one of its post-war products a portable screening and crushing plant with the Ebersol two-stage force feed jaw crusher which has some unusual features. This plant, which has been manufactured for the armed services, will soon become available for civilian requirements.

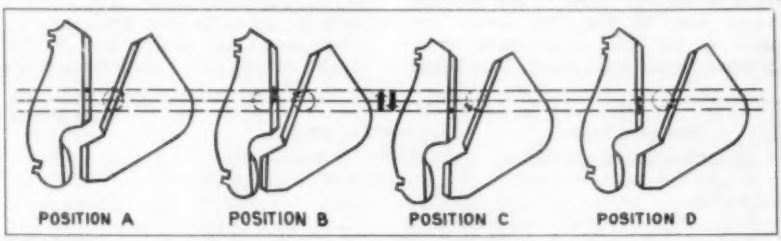
An outstanding feature of this crushing and screen plant is the Ebersol two-stage force feed jaw crusher which is operated with one main shaft. Designed to produce a uniform cubicle aggregate, this crusher has unique jaw action. The main jaw has a rotary motion, and the opposing jaw goes up and down during the working cycle. Thus, the eccentric jaw, in its orbit, rolls upward and toward the opposing jaw—downward and away from it. The opposing jaw moves up and down in unison with the eccentric jaw during all phases of the crushing circuit. This motion of the jaws does not stop material in its downward flow, but rather accelerates it beyond the speed of gravity.

Secondary jaws are protected against tramp iron by a bank of coil springs at the forward end of the extended arms. When tramp iron finds its way into the jaws the springs will keep giving, through a force lever application, until the piece drops out or until the crusher can be stopped. However, the coil springs will not yield in normal crushing. If large pieces of metal, such as dipper teeth and sledge hammers, should wedge in the upper part of the jaws the crusher will stall without harm to the component parts. The crusher can be started under full load without prying out the material in the jaws.

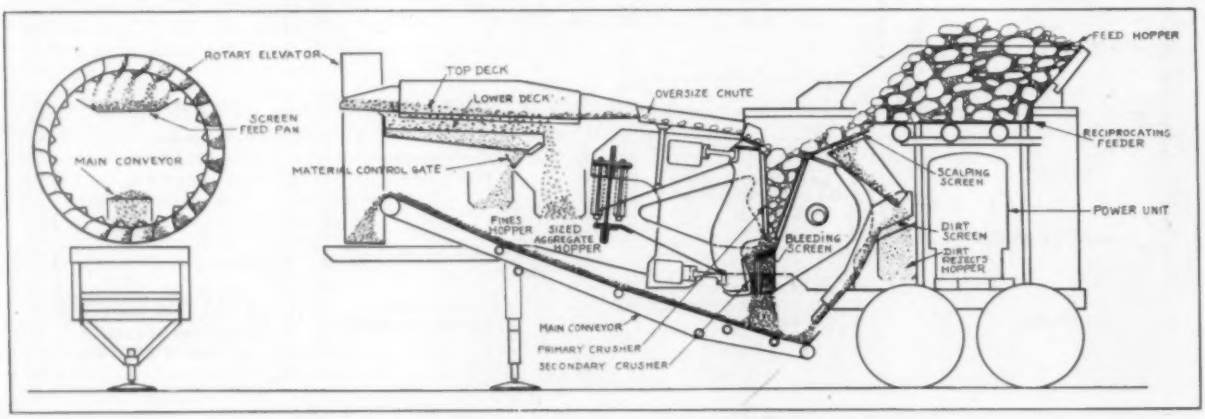
Crushing and screening plant, having two-stage, forced feed jaw crusher

The plant consists of a feed hopper, feeder, live grizzly, two-stage, 15 x 24-in. force feed Ebersol crusher, main conveyor, rotary elevator, two-deck sizing screen, two truck-loading conveyors, and a dirt reject conveyor. This plant, together with a power unit and all accessories, is mounted on one semi-trailer, ready in a few minutes to move around in a pit or quarry, or to travel 25 miles an hour.

It is said that the crusher will take rock 15- x 24-in. or under, and reduce it to pass a ⅝-in. screen. However, the range of finished sizes is from ⅝ in. to 4 in. maximum screen size under normal conditions. Crusher jaws are quickly adjusted from ⅝ in. to 3 in. at the discharge end.



Showing motion of crusher jaws. Postion A, top of stroke with right jaw moving left to clinch stone; position B, both jaws moving downward in forced feed action; position C, bottom of stroke; position D, return stroke



Elevation cross section details of crushing and screening, showing material flow

Plant capacity is 25 to 35 cu. yd. per hour, passing 1¼-in. square mesh screen. Capacities up to 50 cu. yds. or more per hour are attained in gravel production. For crushing hard limestone, the capacity ranges from 14 to 18 tons per hour with a ⅝-in. screen, square opening, to from 60 and 70 tons per hour with a 3-in. screen, square opening.

Operation

Raw uncrushed material is deposited into the feed hopper which has a reciprocating feeder that moves it over a scalping screen into the crusher throat. The scalping screen passes small stone and fines into a chute that directs them over a dirt screen. Here dirt and sand are removed from good, usable stone and fall onto the dirt conveyor. The stone continues down the chute to the main conveyor.

Scalping screen, dirt screen, and adjoining chutes are fastened to the moving jaw ahead, which is driven by the eccentric main shaft. This arrangement is said to impart "life" or movement to chutes and screens thereby increasing efficiency.

Stone fed into the crusher is pulled down and rapidly reduced by the force feed action of the crushing stroke. Discharged from the upper set of primary jaws, constituting the primary crusher, the crushed rock rolls over a short bleeding screen where most of the fines pass through and onto the main conveyor belt below. Stone rolling off the bleeding screen enters the lower set, or secondary crusher, where it is crushed to the desired size and discharged onto the main conveyor.

Usable material is discharged through three outlets to the main conveyor. This conveyor carries all material upward and forward to the rotary elevator which discharges the crushed stone on the screen feed pan of the top deck of the sizing screen.

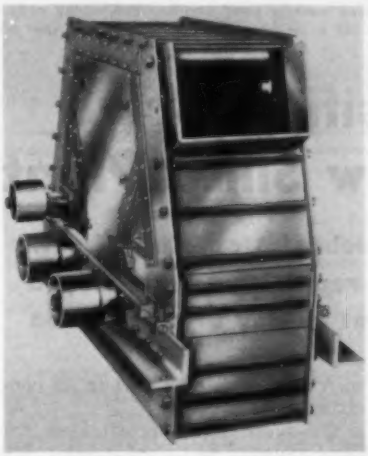
Two grades of finished material are produced over the top and lower deck. Material passing the lower deck goes into a hopper labeled "fines," and material from the top deck falls into a hopper marked "sized aggregate." An adjustable material control gate may be used to divert all or any proportion of the fines to the sized aggregate hopper. Conveyor hoppers have a small surge capacity, sufficient to allow conveyors to be stopped while changing trucks. An oversize chute at the discharge end of the top deck carries oversize stone into the crusher throat to be reprocessed.

Heat Resisting Paint

QUIGLEY COMPANY, INC., New York, N. Y., has developed what has been termed a Triple-A high heat-resisting paint. For interior use, where moisture conditions are normal, the paint is ready for service. However, for interior use where wet conditions prevail, it is necessary to heat the paint film to at least 300 deg. F. after application. When this paint is used on exterior surfaces, a heat cure is necessary to obtain maximum resistance to weather. A heat cure to 500 deg. F. is necessary to set the paint film.

Double Impeller Crusher

NEW HOLLAND MACHINE CO., New Holland, Penn., has anounced its model 3030, Little Tarzan double impeller crusher. This crusher is said



Crusher employing a new principle has a capacity from 100 to 150 tons per hour

to be capable of reducing in one operation rock up to 30 in. in size to 80 percent minus one inch with a capacity of from 100 to 150 tons per hour.

Unusual characteristics which mark the new crusher are a pair of gigantic impellers operated clockwise and counter clockwise with the tops of the impellers running away from each other. The rock, entering from the top or from either side is struck by impeller bars traveling at speeds varying from 300 to 900 r.p.m., and thrown against the breaker-bars under the reinforced steel top, crushing by impact. The process continues until the stone has been reduced to the required size and passes around the impellers and out through the discharge opening.

Impeller crushing unit

The impellers are 36 in. in diameter and weigh 3200 lbs. each. In addition each impeller is fitted with three manganese impeller bars weighing 400 lbs. each, making the combined weight of the two impellers a little more than 4½ tons. However, the entire unit can be run with from 50 to 100 hp.

The compactness of this crusher is emphasized by its comparatively light weight; it weighs only approximately 12 tons. It is said to lend itself to both portable crushing plants and stationary installations.

For removing clay and dirt from stone and gravel, the crusher may be equipped with a pressure water system. It is claimed that deposits containing clay or other soft material can be satisfactorily worked with this crusher, the soft material being reduced by the impact blows and automatically removed by the sizing screen.

Tire Tread Design Reduces Temperature

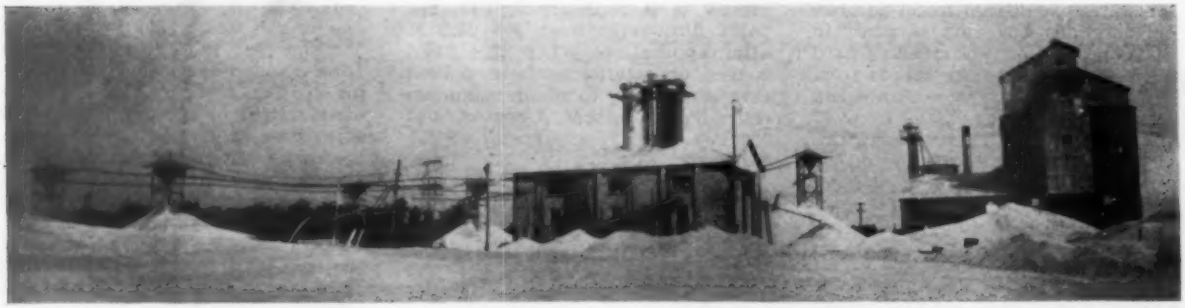
THE GOODYEAR TIRE & RUBBER CO., Dayton, Ohio, has brought out a new tread design for truck tires of synthetic rubber which retards the growth of tread cracks and reduces the running temperatures by as much as 50 degrees, it is claimed. With "Hi-Miler S Rib" tread, as it has been designated, retarding of crack growth is accomplished by altering the conventional, continuous tread ribs to include terminals at approximately every half inch in the crevice between the ribs. It is in these crevices that damaging breaks or cracks usually originate.

Stops Concrete Dusting

SYNTHEX PRODUCTS CO., New York, N. Y., has announced a liquid treatment for concrete floors known as Synkrete Concentrate. This preparation is designed to prevent dusting of concrete floors, make the floor harder, more resistant to traffic, water infiltration, oils, greases, and chemicals. One gallon of concentrate gives four gallons of ready-to-use Synkrete. About 1000 sq. ft. of floor area can be covered with one gallon of the liquid.

Removing Rust from Tools

TOOLS used around the plant are forever getting wet and rusted. The rust may be removed simply by immersing the tools in a solution of one tablespoon of ammonia citrate in a pint of water. If the solution is used cold, it will take about 12 hours. The solution can be used repeatedly. Another rust removing solution is made of 9 gm. of zinc powder and 9 gm. of caustic soda.



Overall view of new plant. To the left and between washing plant (center) and drying and screening plant (right) are dewatering hoppers and stockpiles, each for a separate grade of sand. Note that all sand is pumped

Hydraulic Classifiers Solve Problem at New Silica Plant

George F. Pettinos, Inc., celebrates opening of new plant at Manumuskin, N. J., replacing one destroyed by fiire. Hurricane hits plant on day of celebration

AT THE INVITATION of George F. Pettinos, Inc., Philadelphia, Penn., we were privileged to participate in a party on September 14 at Manumuskin, N. J., celebrating completion of the company's new industrial sand washing and drying plant at that location in South Jersey.

Early in 1943 the original plant was completely destroyed by fire and had to be rebuilt under extremely adverse conditions as to materials and labor. Company personnel designed the new plant and regular employes completed the construction of a modern and fireproof concrete and steel plant that is a credit to the company and to the loyalty of its workers. Company officials arranged the party for the workers and supervisory personnel, in appreciation of their fine work. It closed its downtown offices for the day and arranged for transportation of all office personnel to the plant site to participate in the party. An estimated 100 people were there, including supervisory personnel from other plants of the company in New Jersey and some of the equipment suppliers.

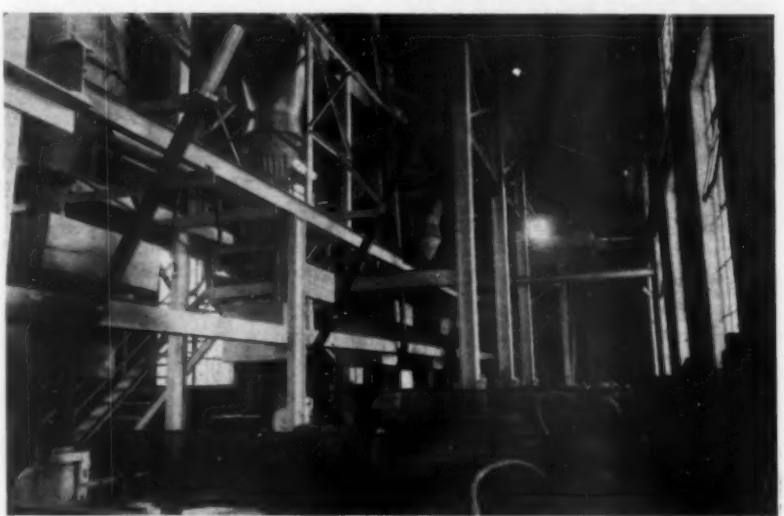
The party will be long remembered for, in the midst of the celebrating, the hurricane which struck New Jersey with such devastating results on that day hit the plant with all the fury of its 100 mile per hour winds. The plant, with its 100 ft. high unprotected super-structure, withstood the storm without any damage which must have been gratifying to all the men there who took part in its construction.

The plant has approximately the same capacity as its predecessor, 600 tons per day, but it has many new features which prompted us to revisit it the day after the storm for the purpose of photographing and describing it in this article.

George F. Pettinos, Inc., is one of the East's largest producers of industrial sands, with operations in four States. It has operated a plant at Manumuskin since 1927, where the deposits are particularly suited for the production of unbonded molding and core sands, foundry sand, sand blast sand and filter sand and gravel. The sand has an analysis of plus 99 percent SiO_2, with one percent of clay contamination in the bank, and the shapes of the sand grains are classified as round to sub-angular.

Specifications for the bulk of the production are in the size range from 6-mesh to 140-mesh and 60 percent of the production, sand blast and filter sands, is in the 6-mesh to 40-mesh range. The deposit bulks at 32-mesh.

Excavation is by hydraulic dredging since, of a 60-ft. workable face, 50 ft. is below water level. A 2½- to 3-ft. layer of topsoil is first removed by a Cummins Diesel engine-powered unit crane with a 35-ft. boom and ½-cu. yd. clamshell bucket. A clamshell bucket is preferred since the material is loose and there are many stumps which must be removed.



Interior of washing and classifying plant, showing battery of rising current classifiers, above, and individual sand pumps below. Each classifier-pump combination handles a separate grade of sand for direct delivery to dewatering hoppers and stockpiling

By BROR NORDBERG

Closeup of stockpile of sand which is dried and then separated into four grades of blast sand. Drying and screening plant is in the background. Note cable-suspended pipelines (incoming and overflow) from classifying plant to dewatering hopper

At present, excavation is limited to 50 ft. below water level, since below that level the percentage of gravel increases perceptibly and the market for gravel sizes is at present relatively unimportant.

Excavation by Dredge

Excavation is now proceeding at a point approximately 1000 ft. distant from the new washing plant. The dredge is very similar to hydraulic dredges used by the commercial sand and gravel industry and the pipeline is of pontoon-supported spiral steel pipe.

The pump is a 6-in. Millville centrifugal dredge pump V-belted to a 100-hp. electric motor. Its capacity is 60 tons of solids per hour delivered to the washing plant, pumping at 50 p.s.i pressure, which is sufficient, over a 12 hours' run, to keep the washing and classifying plant running 24 hr. The gravity head to the washing plant, which must be overcome, is 27 ft.

The pump is of cast iron, to resist abrasion, and is operated with a 6-in. suction and an 8-in. discharge, delivering a total of 1500 g.p.m. with 10 percent solids to the washing plant. The company follows a practice, in all of its plants, of using a discharge line of greater diameter than the rated pump size and suction pipe in order to slow velocity and decrease frictional head line losses. Spiral steel pipe is used wherever lightness is a factor in handling.

This plant in its entirety may be considered as comprising three principal parts—the washing plant, stockpiling, and the drying and screening plant.

Washing Plant

Washing plant is of concrete masonry construction and, in its principles of operation, differs considerably from the old plant. The main basic difference is that classification into various size ranges is accomplished by hydraulic classifiers. In the old plant, the sand was classified through a succession of rotary screens, with the application of water throughout. Frequent shutdowns had to be made to repair holes on the screens so as to avoid contamination of the individual sand sizes. Furthermore, the company is getting very accurate control through hydraulic classification.

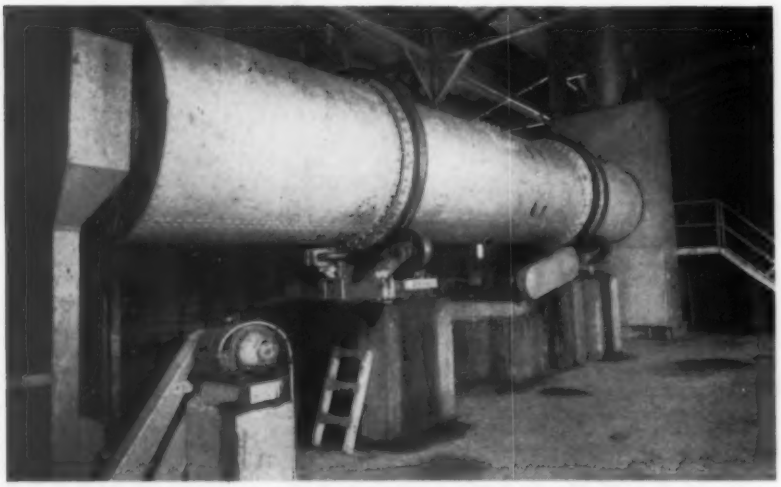
The thoroughness of the washing operation in this plant is impressing. After the original separation of clayey water at the start of the washing operation, the sand is subjected to two complete washings with *clear* water. It is desired to remove all clay since in foundries using oil sand cores the absence of clay in the sand amounts to savings of up to 25 percent in core oil. Clay absorbs core oil and makes for wasteful practice.

Sand and water pumped from the dredge discharges into a collecting box from which it flows through a short pipe into a 4- x 12-ft. revolving screen. Plus 6-mesh material is rejected here and is stockpiled outside through an inclined steel pipe. Most of this material is gravel in the ½- to ¾-in. size range and it represents about 5 percent of the total solids handled.

All the screen throughs and water flow into a settling box of calculated dimensions and volume to settle plus 140-mesh grains. Approximately 50 percent of 140-mesh to 200-mesh grains are also recovered. It measures 13 ft. by 16 ft., with a 4-ft. depth, and has rows of inverted pyramids in the bottom to guide the settling grains into nine drawoff holes, three to a row.

All the water overflowing the weir is wasted back to the pond, and collecting pipes from each of the nine drawoff points on the underside of the collecting box guide the sand into the head box for a 4-in. Wilfley sand pump. The sand sizes can be varied before entrance into the sand pump by changing the reducing

Inside of washing and classifying plant, showing sand pumps and their individual head boxes which receive sand from overhead, separate rising current classifiers. From foreground to background, sand grades produced are successively of finer size



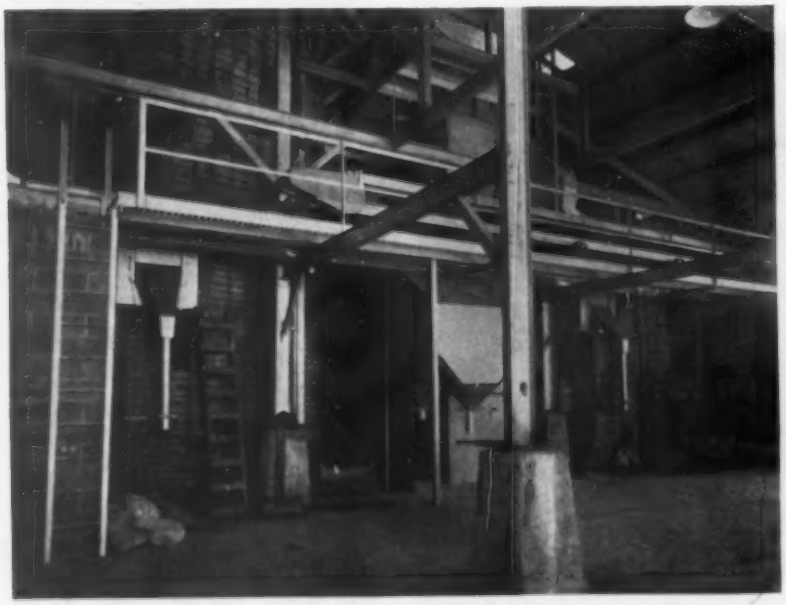
View of 6 x 33-ft. indirect heat, oil-fired rotary dryer taken from the discharge end. Table feeder regulates flow of sand into dryer.

bushings at any drawoff point. Thus, more or less of the finer sand particles settled in the far end of the box can be blended with coarser particles drawn from the first row of drawoff points by allowing more or less to be withdrawn into the head box.

The 4-in. pump delivers the sand simultaneously into two 200-ton steel feed tanks, and the rest of the dirty water overflows these tanks into pipelines to waste. At the end of a 12-hr. dredge shift, with the washing and classifying plant in operation, these tanks will be full of sand, sufficient to keep the classifying plant going on the night shift. Classifying capacity is 25 to 30 t.p.h.

Sand is classified into four size grades by successive passage through four Shaw rising current classifiers. The first three are 24-in. machines and the fourth, for finer size classification, is a 30-in. machine.

A regulated flow of sand, 70 percent solids, is withdrawn from the storage tanks simultaneously and fed with 200 g.p.m. of fresh water through a flume into the first classifier. Hydraulic water is added in each classifier, of course, and at the end of the process the flume carries about 400 g.p.m. of water.



Interior of drying and screening plant. Note bagging hopper between stave silo bins and overhead shuttle conveyor for loading bulk sands into cars

Approximately 60 percent of the overall production is the product of the first classifier, which is adjusted by constant head and constant pressure to discharge sand grains from 6-mesh to about 40-mesh in size. This particular grade is later dried and screened into four sizes of blast sand or into various grades of filter sand.

No. 2 classifier makes a separation in the 24-mesh to 50-mesh range, a size used in foundries for making cement concrete molds and for certain sizes of ordinary molds and cores. No. 3 classifier discharges a product approximately 30-mesh to 70-mesh, used in foundry work and for small cores and molds. The product of No. 4 classifier, about 60-mesh to 120 mesh, is sold for foundry work. Each product discharges into a head box for a 3-in. self-priming Wilfley sand pump (4 pumps), where clean water is added and the sand pumped outside the plant for dewatering and storage. Two-inch pumps would handle the volume but larger sizes are used to prevent plugging of the lines. Each pump delivers to a separate dewatering steel hopper some 45 ft. above ground storage level, where the water overflows into waste pipelines. Every half hour or so the sand is discharged from the hoppers. An operator in the plant, through levers and cables, opens rubber stoppers in the bottoms of the hoppers to release the sand into respective stockpiles. Sand discharged from any of the four classifiers in the plant can be diverted into the head box of any of the four pumps if a blended product should be desired. The wasted product of the fourth classifier, containing mainly 80-mesh to 200-mesh fines, enters a settling box. A fifth pump will be installed for recovery of this product.

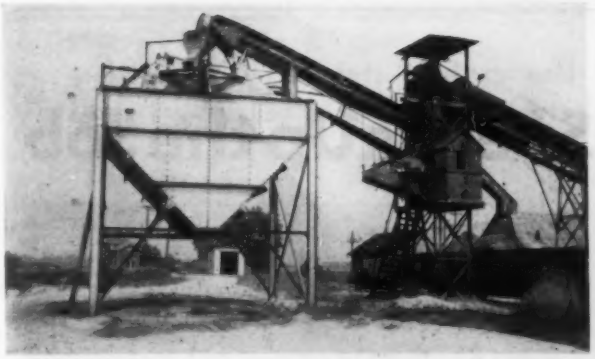
Stockpiling

Each grade of sand is pumped to its dewatering hopper through cable-suspended 4-in. pipelines in preference to having structural supporting members which would interfere with operation of the stockpile crane. Under each hopper, 4000 tons of sand can be stockpiled for drainage to about 3½ percent moisture before shipping. A Diesel-powered Northwest crane with a 40-ft. boom and a 1-cu. yd. clamshell bucket loads drained sand into cars or trucks, and is also used to feed drained sand into a hopper if the sand is to be dried. Most of the sand to be dried is that discharged from No. 1 Shaw classifier, and for that reason, is stockpiled close to the drying plant.

Drying and Screening Operations

The balance of the operations, drying and screening, take place in a separate building. Sand is fed out

(Continued on page 67)



Left: Six-compartment bin for truck loading. Transfer house at the right where material from plant stockpile conveyor may be diverted to railroad cars or truck loading bin conveyor. Right: Diesel locomotive of 44-ton capacity

Simplify Car and Truck Loading

Lincoln Sand and Gravel Co. replaces two steam locomotives with one Diesel

GREATER EFFICIENCY and more economical operation have been attained at the Lincoln Sand and Gravel Co., Lincoln, Ill., by the addition of new equipment.

To facilitate truck loading, a six-compartment Butler bin, having 25 ton capacity per compartment, was installed in 1940. Previous to this installation, only railroad cars were loaded at the loading tower. The cars were then moved to a track hopper where they were discharged into the hopper for truck loading. The addition of the Butler bin eliminated this extra handling. To charge the bin, a 30-in. Barber-Greene belt conveyor, 50-ft. centers, was added to the loading tower. A flop-over gate permits either car or bin loading. A swivel chute from the belt conveyor to the bin permits loading to the desired compartment. Having the bin located at the loading tower results in a much greater efficiency of operation and permits a much larger percentage of trucks to be loaded.

Two steam locomotives for transporting cars were replaced in 1943 by a 44-ton Davenport-Bessler Diesel locomotive. This is a double unit locomotive, having two 150-hp., 6-cyl. motors. This company feels that the Diesel will accomplish more than a 60-ton steam locomotive and estimates that a saving of about $25.00 per day has been achieved.

For housing the locomotive, a special building was constructed of concrete masonry block. A spur track leads into this house, which also contains a grease pit, 5 ft. deep, for servicing the Diesel. Overhead beams are also installed, for handling the engine with the aid of block and tackle. The house is 45 ft. long, 20 ft. high, and 15 ft. wide. A boiler provides hot water heat for maintaining a warm temperature during cold weather.

The success achieved by the use of a Simplicity "D-Watering" wheel for the removal of excess water from sand, prompted the installation of a similar wheel for dewatering gravel. This wheel is 10 ft. in diameter and 3 ft. wide and replaces a double-deck screen which was used for the same purpose. Experience has shown that this wheel gives greater efficiency, requires less maintenance, yields a much drier product and has a capacity ten times in excess of the screens when used for this purpose.

Plans for the near future include the installation of a triple-deck screen located adjacent to the wheel for the purpose of separating the incoming material for transference to either of the two wheels. Material passing the screens will go to the wheel for dewatering sand and oversize will go to the newly installed wheel. This will relieve the load now placed on the screens further on in the screening plant.

Diesel locomotive is housed in this concrete block building. It is equipped with grease pit

A complete writeup of this plant appeared in the May, 1939, issue of ROCK PRODUCTS.

V. O. Johnston is president of the Lincoln Sand and Gravel Co., F. W. Longan is vice-president and treasurer, E. G. Johnston is secretary, R. E. Weaver is general manager and H. D. Clouse is superintendent.

Stone Producers Meet in Chicago

A MEETING of crushed stone producers of the Midwestern region (Iowa, Illinois, Indiana, Kansas, and Missouri) will be held at the Palmer House, Chicago, on October 6, 1944. The meeting will discuss problems of mutual interest and particularly to develop ways in which the National Association can more effectively serve the industry in this area. An opportune time presents itself for such a meeting immediately following the sessions of the Cement and Quarry Section of the National Safety Council to be held in Chicago on October 4 and 5. A. T. Goldbeck, engineering director; E. W. Bauman, field engineer, and J. R. Boyd, administrative director, will attend the meeting.

Extend A.A.A. Phosphate Date

REPORTS from the Tennessee phosphate field indicate that it will be again necessary to extend the date from September 30, by which time applications for soil improving materials should have been made under regulations for A.A.A. benefit credits in the 1944 program, as a very large tonnage of phosphate is still unshipped and cannot be entirely supplied even before January 1, 1945.

Acid-Proofing Concrete

CONCRETE can be made harder and denser and thus more water and acid-proof by adding about one percent of sodium silica-fluoride and calcium or aluminum to the cement mix.

Stockpiling

Electric Ballast Car Speeds Up the Job

TO SPEED UP the stockpiling of crushed stone and to reduce costs of this operation, Melvin Stone Co., Melvin, Ohio, has adopted a flat bed, ballast car, of the type used by electric railways for ballasting their roadbeds, for the hauling of stone from plant bins to stockpiles.

This concern operates a crushed stone plant of 150 to 175 t.p.h. capacity and makes use of extensive stockpiles which extend almost one-quarter of a mile from the plant. For many years, a locomotive and from three to five gondola cars were used for stockpiling, with a 1½-cu. yd., 21-ton locomotive crane to empty the cars and reload stone for shipment.

This system of stockpiling was considered uneconomical due to the high maintenance cost in the repair of cars damaged by the clamshell bucket and the wear and tear on railway trackage from frequent switching. Furthermore there were occasional wrecks of the moving equipment and there was too much waiting time on the part of the locomotive engineer and the crane operator to satisfy the management.

It so happened at the time the company was looking for a better system, that the Differential Steel Car Co. manufacturers of electric railway ballasting cars, had a standard gage gasoline-electric combination locomotive and car on hand which was purchased.

The unit consists of the locomotive and a flat bed body of 35 tons capacity (level full, for stone) in a single unit so no coupling or uncoupling is necessary. The locomotive-car is driven under the plant bins, loaded and proceeds to the stockpiling area where it discharges a complete load of crushed stone in 20 seconds.

It has four traction axles, each of which is driven by a 75-hp. electric motor, and the electric power for all the motors is generated by two 150-hp. Buda Diesel engines connected to two generators which develop current at 500 volts d.c. All electrical equipment is by Westinghouse. The Diesel engines are started by 36-volt electric storage batteries. There is sufficient power to drive a full load at the rate of 18 m.p.h. in negotiating a 3 percent grade when fully loaded. The car weighs 47 tons empty.

The unloading mechanism is of particular interest. The car can dump to either side of the track. When the operator desires to dump the load, he presses controls that

Side-dump body shifted to one side by electric motor drive mechanism preparatory to dumping

Load being dumped, showing how stone is thrown clear of the truck

Other side of gasoline-electric dump car which may be unloaded on either side

Melvin Stone Co. cuts haulage and stockpiling costs by the use of a gasoline-electric dump car

Gasoline-electric ballast car which carries crushed stone from plant to stock pile area ready to dump its load

cause the entire bed to shift out two feet to clear the track (either side) before it tilts up to the discharge position.

A 10-hp. motor is the drive for the dumping mechanism, with a worm gear drive and cable wound around a drum shaft at each end of the car. The cable is wound for two-way travel. In dumping, another cable operated off the same motor throws the bed off balance and the bed practically turns into a dumping position of its own weight. Power is necessary principally to pull the bed back into normal position.

Elevate Track Above Stockpiling Area Near Plant

To operate the locomotive car it was necessary to have the track elevated four to six feet above the level of the stockpiling area, which necessitated raising the tracks and some excavation on one side of the tracks. Procedure is for a loaded car to be driven to a desired unloading point, discharge the stone and return to the plant bins for another load while the locomotive crane is moved up to place the stone aside into stockpiles.

Spotting and switching of railroad cars is also done by this machine, which has sufficient tractive power for operation on one of the two generators. Complete cost records are not available but it is known that stockpiling is now done cheaper than it was with a gasoline locomotive and gondola cars, due to the elimination of practically all maintenance insofar as the moving equipment is concerned. The bed has ⅜-in. steel plate and is of water-tight construction.

New Silica Plant

(Continued from page 64)

from the underground hopper by a Robins belt feeder into a Robins enclosed belt bucket elevator, 65-ft. centers, for delivery into a 380-ton concrete stave silo or into a hopper from which a table feeder regulates its flow into a 6- x 33-ft. oil-fired Ruggles-Coles dryer. The alternate flow is for sand to be drawn from the silo and elevated by a 24-ft. elevator to the hopper from which the dryer is fed. The elevators have a capacity of 60 t.p.h. and the dryer will handle 30 t.p.h. The dryer turns at 7 r.p.m. and the intensity of the flame is varied according to moisture in sand.

Dried sand is carried by a 14-in. screw conveyor to a bucket elevator, 80-ft. centers, to the head of the plant for screening. It may be bypassed the screens for direct loading into cars or it may be sized and placed in concrete stave silo storage bins. In screening, the sand is first put through a 3- x 8-ft. revolving screen, with 10-mesh, 23 gauge cloth and a 6- to 10-mesh product is sent to a bin. This is No. 3 sand blast or a fine size of filter gravel.

All minus 10-mesh sand is split over two double-deck vibrating screens, a 3- x 8-ft. Link-Belt and a 3- x 6-ft. Niagara, for further sizing. A 10- to 14-mesh product off the top decks is No. 2 sand blast, a 14- to 24-mesh product retained on the lower decks is No. 1 sand blast sand or filter sand and minus 24-mesh is No. 0 sand blast or filter sand.

Storage is provided in four 800-ton concrete stave silos. The company purchased a silo stave machine and manufactured 10- x 30-in. tongue and groove staves 2½ in. thick for the erection of the silos, which are 20 ft. in diameter and 51 ft. high. Concrete roofs were cast for the silos, which incidentally support the plant superstructure. All structural members are of welded fabrication and the building is enclosed with corrugated iron sheeting roof and galvanized iron side walls.

Each silo has an adjustable draw-off gate at the floor level to a single common belt conveyor in order that sands may be blended to any size specification below 6-mesh in loading cars. The conveyor discharges into a bucket elevator which can fill a 3-spout hopper for loading sand into paper or burlap bags or transfer the sand on to a shuttle belt conveyor for bulk loading of railroad cars. A Stephens-Adamson box car loader is used in loading box cars.

George F. Pettinos, Sr., now 82 years of age, president of the company, is one of the pioneers of the sand industry. He has been producing sand for over 50 years and, incidentally was present at the party.

George F. Pettinos, Jr., vice-president and general manager, who is particularly active in the production end of the business, supervised the design and construction of the plant. William D. Faint, chief engineer, did the actual design work and George Guiles is superintendent of the plant. Louis Dill is secretary and sales manager of the company and Gordon C. Prestwood is treasurer.

The company also operates the following plants:

Location	Product
Manumuskin, N. J.	Washed sand
Centerton, N. J.	Asphalt sand
Millville, N. J.	Bonded foundry sand
Cedarville, N. J.	Washed core sand
Mt. Holly, N. J.	Bonded foundry sand
Woodbine, N. J.	Washed sand
Elnora, N. Y.	Bonded foundry sand
Stuyvesant, N. Y.	Bonded foundry sand
East Sandwich, Mass.	Bank foundry sand
Wareham, Mass.	Bank foundry sand
East Greenwich, R. I.	Bank foundry sand
Spring City, Penn.	Graphite mill

Subsidiary companies:

Bridgeton Sand Co., Williamstown Junction, N. J. Silica sand for glass and foundry work.

Reading Sand Co., Penbryn, N. J. Silica sand for foundries and special concrete work.

A. T. Harris & Son, Honey Brook, Penn. Crushed silica rock.

Tug Sonittep Co., Wilmington, Del. Inland and coastwise towing.

George F. Pettinos Canada, Ltd., Hamilton, Ont., Canada. Industrial sands and supplies.

Ohio Ready Mix Convention

Characteristics of air-entraining cements and their possibilities were discussed at recent Lima, Ohio, meeting

ONE of the best crowds in recent years was drawn to the Ohio Ready Mixed Concrete Association convention, held on Thursday, Sept. 14, 1944, at the Shawnee Country Club, Lima, Ohio. Attending were a total of more than 100 members and guests.

Prior to the meeting, some of the members took advantage of the excellent greens and fairways of the Country Club and indulged in a round of golf, while others used the time for a social get-together. At noon, the assembled gathering sat down to a very enjoyable meal. After this banquet, the meeting was called to order by Julius J. Warner, president of the Association. Mr. Warner introduced a number of the guests, including producers from Indiana and members of the Ohio State Highway Testing Laboratory. W. Platt Greer of the Universal Atlas Cement Co., Pittsburgh, Penn., was lauded for his efforts as host of the convention. Mr. Greer is president of the Shawnee Country Club and as such made the entertainment preceding and following the meeting highly enjoyable to all. Claude L. Clark, secretary of the Association also came in for his share of credit for making the convention a success.

STEPHAN STEPANIAN, past president and present treasurer of the Association then spoke briefly on the activities of the National Ready Mixed Concrete Association during the past six months.

Air-Entraining Cements

STANTON WALKER, Director of Engineering, National Ready Mixed Concrete Association, Washington, D. C., then gave the principal talk, titled "Air Entraining in Cement," and led the discussion following the speech. Mr. Walker elaborated on the history of air entraining cement and discussed its uses, benefits, possibilities, and methods of control. He also discussed transportation of concrete in transit mixers as well as concrete transported from a central mixing plant. In his talk, Mr. Walker stated that the air entraining cement is meant to be used only in pavements subject to frost action. Pressure has been brought to bear to use this type of cement for all purposes but this is not to be recommended at present, since there is not enough control of uniformity yet. He predicted that it would be used universally sometime in the future after further experimentation. The first air entraining cement was based on the use of vinsol resin as the air entraining agent, the amount to be used determined by chemical analysis. Recently, however, other agents have been used and the mortar test used to determine the percentage of air entrained. He also stated that air entraining cement is not the only means of making concrete containing air. Materials may be added at the mixer for the same results. The best results obtained from air entraining is found at the point where from two to three percent is entrained. More than this does not increase the durability of the concrete and necessarily reduces its strength. With two to three percent of air entrained, it has been found that the reduction in strength is only about 10 percent. Reduction in strength can be predicted if the amount of air entrained is known. The proper corrections to bring up the strength of the concrete to specifications can then be made.

Mr. Walker also stated that the entrainment of one gallon of air will cause the same reduction in strength as one gallon of water. Or for a further example: With one cubic yard of concrete using a six-bag mix, and having a five percent entrainment of air, the same effect is made on the strength as if 1⅗ gal. of water were added per sack of cement. Any amount of air permits some reduction in mixing water but

Julius J. Warner, president of the association

Left to right, Chet Steenberg, "Doc" Wylie, Ralph Anderson, A. W. Kimmel, W. E. Pohlman, and L. L. Wilson

Another group on the golf course. Left to right, Henry C. Fraas, Claude Clark, Mrs. W. P. Greer, "Doc" Wylie, W. P. Greer, host to the convention; C. I. Bohmer, and S. Wenban

not proportionately. Entrainment of air also permits reduction in fine aggregate. For example, five percent of air entrained will allow a five percent reduction of fine aggregate.

Mr. Walker also stated that air entraining cement has a lesser tendency to segregate and is more cohesive, has better plasticity, less slurry, better homogeneity, and less free water. Experiments are now being conducted to determine the effect on air entrainment in transit mixers and agitators. Various lengths of mixing times are being used, air is introduced to the mixing drum under pressure, and various speeds are used on the transit mixer to try to determine whether or not they have any effect on the percentage of air entrained. He also said that different types of sand used in the mix will entrain different amounts of air. Finer sand will entrain a greater percentage than a coarser sand. The critical size has been shown to be between the minus 50 and minus 30 mesh.

At the conclusion of the talk, a vigorous discussion took place. Mr. Walker was kept busy answering questions in which he received support from C. H. Allen and J. F. Barbee of the Ohio State Highway Testing Laboratory, who have conducted tests of air-entraining cements.

Many of the members remained after the meeting was adjourned and either played golf or cards or just sat down and had a regular social "gabfest." The consensus of opinion was that the meeting was highly instructive and entertaining.

A list of the men attending the convention follows.

Registration

Stanton Walker, Director of Engineering, National Ready Mixed Concrete Association, Washington, D. C.

Julius J. Warner, Richter Concrete Corp., Cincinnati, Ohio.

Stephen Stepanian, Arrow Sand and Gravel Company, Columbus, Ohio.

Wm. F. Kern, Jr., Columbus Builders Supply Company, Columbus, Ohio.

O. H. Seeger, Capt., Corps of Engineers, Cincinnati Testing Lab., Cincinnati, Ohio.

Charles Kelly, Kelly Coal and Supply Company, Lima, Ohio.

Ray V. Foster, Krone & Company, Lima, Ohio.

A. W. Kimball, Lehigh Portland Cement, Chicago, Ill.

R. A. Foley, Columbia Cement, Pittsburgh Plate Glass Co., Zanesville, Ohio.

George Turnbull, Turnbull Fuel and Bldrs. Supply Company, Hamilton, Ohio.

L. F. Goldenbogen, Diamond Portland Cement Company, Middle Branch, Ohio.

Louis Schira, The Louis O'Connell Company, Tiffin, Ohio.

E. H. Raff, Diamond Portland Cement Company, Cleveland, Ohio.

C. R. McAndlis, City Engineer, Fort Wayne, Ind.

Paul Hegler, Universal Atlas Cement, Pittsburgh, Penn.

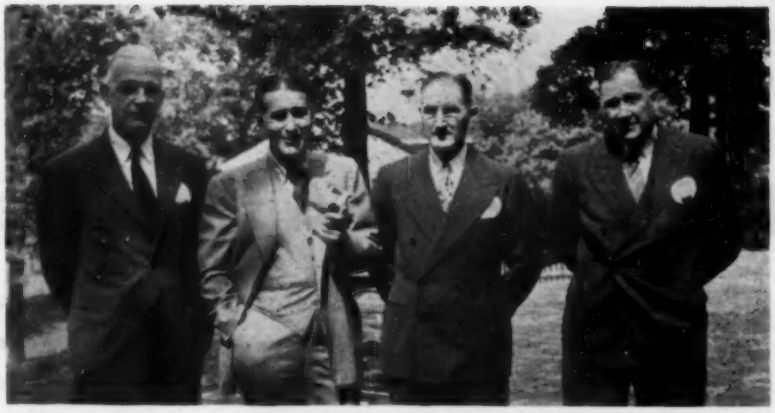
Cliff Wood, Lima Mixed Concrete Company, Lima, Ohio.

Cliff Wood, Jr., Lima Mixed Concrete Company, Lima, Ohio.

Rudolph Raabe, Raabe Grain Company, Continental, Ohio.

Henry C. Fraas, Jaeger Machine Company, Columbus, Ohio.

Fred E. Besco, Superior Cement Corporation, Portsmouth, Ohio.



A foursome at the Ohio Ready Mix meeting. Left to right, A. W. Kimmel, Henry Beckley, J. J. Warner, and Louis Richter

E. L. Maier, Diamond Cement, No. Canton, Ohio.

J. F. Barbee, Engineer, State Highway Testing Laboratory, Columbus, Ohio.

Ernest V. Apt., Southwestern Portland Cement Company, Osborn, Ohio.

C. L. Kramer, Medusa Portland Cement Company, Toledo, Ohio.

J. Fellabaum, Master Builders Company, Columbus, Ohio.

O. M. Green, The Green & Sawyer Company, Lima, Ohio.

W. H. Droege, Fort Wayne Testing Laboratory, City Hall, Fort Wayne, Ind.

H. G. Wood, Portland Cement Association, Toledo, Ohio.

C. H. Allen, Chief Engineer, State Highway Testing Laboratory, Columbus, Ohio.

R. W. Fisher, Erie Materials Company, Fort Wayne, Ind.

C. W. Fuelling, Aetna Cement Company, Fort Wayne, Ind.

Wallace C. Curran, The Dow Chemical Company, Midland, Mich.

Don R. Leavitt, Lehigh Portland Cement Company, Indianapolis, Ind.

Robert Taylor, Diamond Portland Cement Company, Canton, Ohio.

C. E. Kuhlman, Kuhlman Builders Supply Company, Toledo, Ohio.

Robert V. D. Booth, The Union Sand and Supply Corporation, Painesville, Ohio.

C. T. Bohmer, Jaeger Machine Company, Columbus, Ohio.

Louis Richter, Richter Concrete Corporation, Cincinnati, Ohio.

H. E. Brown, Alpha Portland Cement Company, Worthington, Ohio.

H. E. McCann, American Steel & Wire Company, Columbus, Ohio.

Stanton Walker, left, and Stephen Stepanian

Peter M. Hulsken, Architect, 218 Market Street, Lima, Ohio.

Willard W. Wolf, Acme Fireproof Block Company, Delphos, Ohio.

George Goetz, Clifton Coal & Supply Company, Lakewood, Ohio.

S. W. Wenban, Standard Portland Cement Company, Columbus, Ohio.

C. R. Steenberg, Columbia Cement, Columbus, Ohio.

Ralph R. Anderson, W. E. Anderson Sons, Columbus, Ohio.

A. W. Kimmel, Ready Mixed Corporation, Dayton, Ohio.

W. H. Ogg, National Lime and Stone Company, Findlay, Ohio.

T. W. Murray, Huron Portland Cement Company, Detroit, Mich.

Frank G. Mooney, Medusa Portland Cement, Toledo, Ohio.

George McDermott, Collingwood Shale Brick Company, Cleveland, Ohio.

O. L. Heckelman, Medusa Portland Cement Company, Cleveland, Ohio.

F. A. Brine, Universal Atlas Cement Company, Pittsburgh, Penn.

T. A. Monahan, City Engineer, Lima, Ohio.

L. E. DeCamp, Medusa Portland Cement, Cleveland, Ohio.

A. E. Harney, Huron Portland Cement Company, Toledo, Ohio.

Frank X. Clifford, National Lime and Stone Company, Lima, Ohio.

A. F. Unckrich, Portland Cement Association, Columbus, Ohio.

Charles Dittrich, Hilltop Building Material, Inc., Cincinnati, Ohio.

C. P. Shaw, Superior Cement Corporation, Portsmouth, Ohio.

R. K. Plumb, Carnegie Illinois Steel Corporation, Cleveland, Ohio.

William Goldie, Goff-Kirby Company, Cleveland, Ohio.

J. R. Snowball, Portland Cement Association, Columbus, Ohio.

A. E. Strohm, The Collinwood Shale Brick & Supply Company, Cleveland, Ohio.

C. "Dolly" Gray, Ready Mixed Concrete Corporation, Indianapolis, Ind.

Walter Fishering, Erie Materials, Inc., Fort Wayne, Ind.

H. E. Terry, Jr., Medusa Cement Company, Cleveland, Ohio.

Henry Beckley, The Beckley & Myers Company, Springfield, Ohio.

F. A. Wittman, Universal Atlas Cement Company, Cleveland, Ohio.

N. H. Ryder, The National Lime and Stone Company, Findlay, Ohio.

A. J. Baker, Universal Atlas Cement Company, Cincinnati, Ohio.

J. R. Borgelt, Ottawa, Ohio.

A. G. Sawyer, Green & Sawyer Company, Lima, Ohio.

Russ Mumford, Beckley & Myers Company, Springfield, Ohio.

J. H. Shroyer, Western Ohio Stone Company, 702 Cook Tower, Lima, Ohio.

(Continued on page 124)

Specifications

Evaluation of Aggregate Gradations

Part 2: Studies of degradation of aggregate under traffic and laboratory compaction tests emphasize importance of proper grading

By GEO. W. ECKERT*

STUDIES have been made with regard to the degradation of aggregate under traffic and laboratory compaction simulating traffic conditions. The importance of degradation has been dealt with at some length in the literature, among which is the work of M. F. Macnaughton.[1] He developed a pneumatic method of compaction to produce mixtures of high density and studied the effect of compaction by vibration. Results were obtained with aggregate of the type (a) pea gravel 3-4 mesh, and (b) limestone chips 3-4 mesh, among others. At the end of the sixth cycle of compaction, the pea gravel had the grading indicated by curve *A* in Fig. 10, and at the end of the sixth cycle of compaction, the limestone chips had the grading of curve *B* in Fig. 10. This indicates that compaction tends to degrade the aggregate to a grading having a straight line probability relation. A comparison of the curves of Fig. 10 with Fig. 9 (p. 151, August, ROCK PRODUCTS) indicates that aggregates after compaction have grading curves whose slopes are similar to those of the gradings of maximum density.

High density can be obtained by either gap or continuous grading, as has been shown by Furnas, but Macnaughton has pointed out that aggregates of gap grading segregate more readily and are more difficult to handle in actual construction. A similar situation is illustrated graphically in Fig. 11 by the probability method of plotting sieve size against per cent by weight passing the sieve sizes. Aggregate *A* is one which segregated during handling, and aggregate *B* is the product of correcting aggregate *A* to overcome segregation. The deviation of curve *A* from a straight line is very pronounced, whereas curve *B* approaches a straight line relation. The data were taken from the treatise on bituminous roads by Spielmann and Hughes.[2]

It is quite apparent that a number of requirements are necessary before an aggregate grading can be considered desirable for pavement construction. Vokac[3] has approached the problem of aggregate gradation from the point of view of the physical properties in order to determine the gradation of aggregates which may be considered as non-critical or foolproof. The result of Vokac's study was the classification of aggregates into three types. Type 1 as described by Vokac:

"(1) are used with less bitumen than generally required,

"(2) will tolerate a wider variation in bitumen content with only slight effect on physical characteristics,

"(3) will also tolerate a wider variation in fines or filler. Type I aggregates are usually found in straight-run, unwashed quarry products such as screenings and quarry waste. Natural sands when topped at the No. 8 or No. 4 sieve also will result very often in Type I aggregate."

Type II requires some percentage of filler in order to show mixtures having suitable voids and strength. No satisfactory mixtures can be made with Type III within the usual range of mixture composition and with the ingredients used. Vokac has given for representative actual sieve analyses of these three types of aggregates the following values:

Sieve Size	Percent Passing					
(U. S.	No.	No.	No.	No.	No.	No.
Stand'd)	200	100	50	30	16	8
Type I	5	11	26	46	66	84
Type II	1	7	42	73	88	100
Type III	0	4	55	85	95	100

Curves for these types of aggregates are given in Fig. 12. Type I aggregate gives a straight line relation which approaches in slope the curves of maximum density derived from Furnas' data.

Aggregate gradation, and of course its related properties such as surface area, interlocking effects, voids, and density, as affecting bituminous pavement performance is rather difficult to evaluate for bitumen-aggregate mixtures. The most logical method of attack appears to be to test a series of mixtures in which the asphalt type and quantity are maintained constant, and the type of aggregate gradation varied. The data reported by W. J. Emmons[4] can be used for illustrative purposes in this regard. Sections of experimental sheet asphalt pavements were constructed to test the effect of the several constituents of sheet asphalt on the stability of the pavement. The stability of the sections were measured by the movement of screws placed in the pavements. Data were chosen from Emmons' published results for sections in which the type of asphalt and the amount of asphalt were similar.

This information gives the aggregate gradings which are plotted in Figs. 13 and 14. Fig. 13 contains curves which have a common origin, considering the No. 200-mesh value as the arbitrary origin, and shows how the stability of the mixtures vary with the slope. It must be remembered that these mixtures contain filler, and that the forementioned effect may be altered by changes in the type of asphalt, type of sand, type of filler, etc. Fig. 14 contains curves in which the characteristic lines (straight line best fitting all the points) can be considered to have the same slope. Mixture *D* has slightly more asphaltic binder than the other mixtures, but it shows the trend of the effect of changing the grading in the manner indicated. It also is apparent from the curves and data in Figs. 13 and 14 that either or both of the following conditions are present: (a) the stability of the mixtures are particularly sensitive to changes in aggregate grading, including the filler as part of the aggregate; and (b) other factors besides the type and quantity of asphaltic material and the type and grading of the aggregate are important in regard to the stability of sheet asphalt.

The strength of Portland cement mortars and concretes has been shown to vary with the type of gradings of the aggregate in the mixes, and published data for mortars have been used to construct Fig. 15, showing different types of aggregate gradings with their corresponding mortar strengths listed. It appears from Fig. 15 that tensile strength is high

(Continued on page 72)

*Formerly Research Chemist, Missouri State Highway Department. Now with Texas Co., Beacon, N. Y.

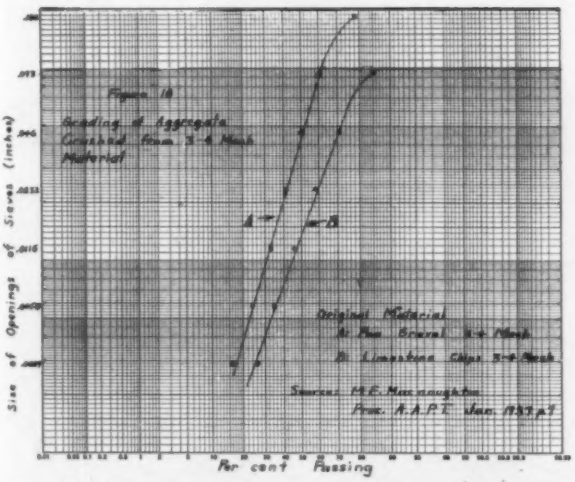


Fig. 10: Grading of pea gravel (A) and limestone chips (B) after subjecting these materials to six cycles of compaction

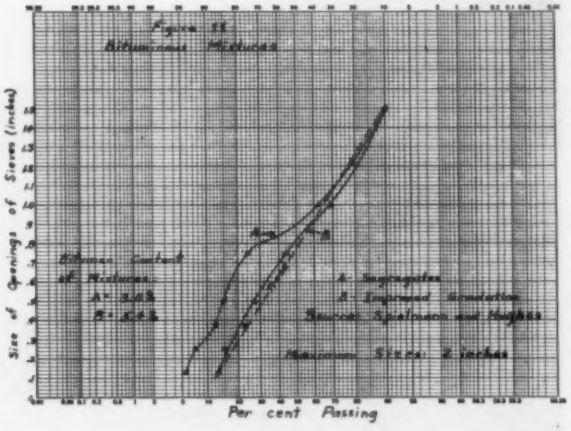


Fig. 11: Probability method of plotting sieve size against percent by weight passing the sieve sizes. Aggregate (A) is one which segregated during handling and (B) aggregate is the product of corecting aggregate (A) to overcome segreagtion

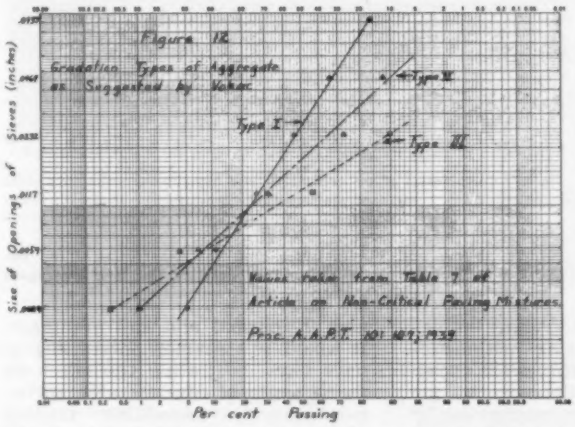


Figure 12
Gradation Types of Aggregate as Suggested by Vokac
Type I
Type II
Type III
Values Taken from Table 7 of Article on Non-Critical Paving Mixtures
Proc. A.A.P.T. 10: 167; 1939
Size of Openings of Sieves (inches)
Per cent Passing

Fig. 12: Three gradation types of aggregate used in preparing bituminous mixes

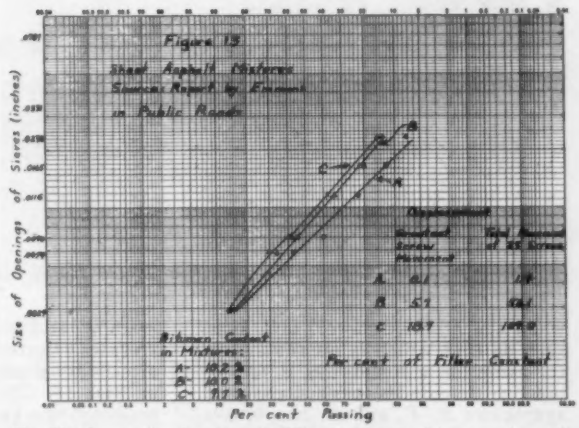


Fig. 13: Curves showing how stability of asphalt mixtures varies with the slope

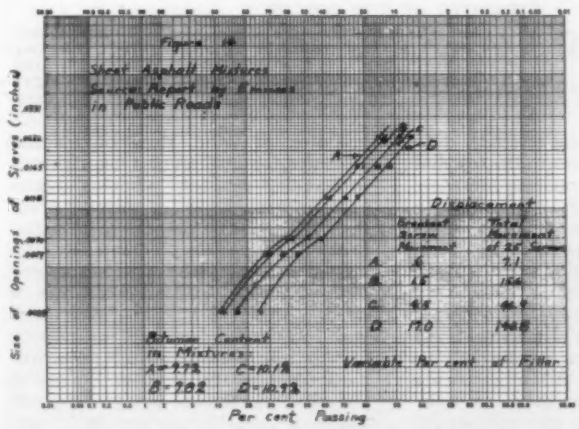


Fig. 14: Curves showing sheet asphalt mixtures in which the characteristic lines can be considered to have the same slope

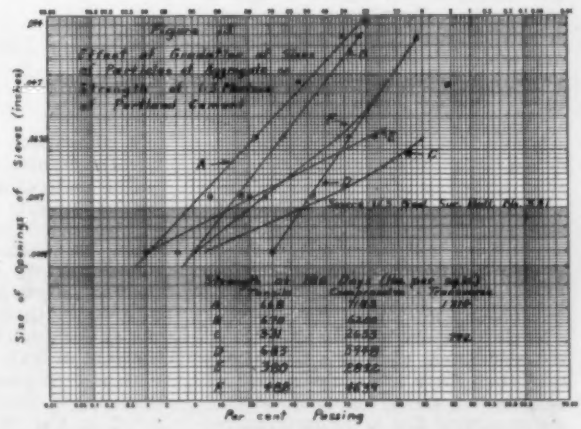


Figure 15
Effect of Gradation of Sizes of Particles of Aggregate on Strength of Mixtures of Portland Cement
A
B
C
Size of Openings of Sieves (inches)
Per cent Passing

Fig. 15: Shows different types of aggregate gradings with their corresponding mortar strengths

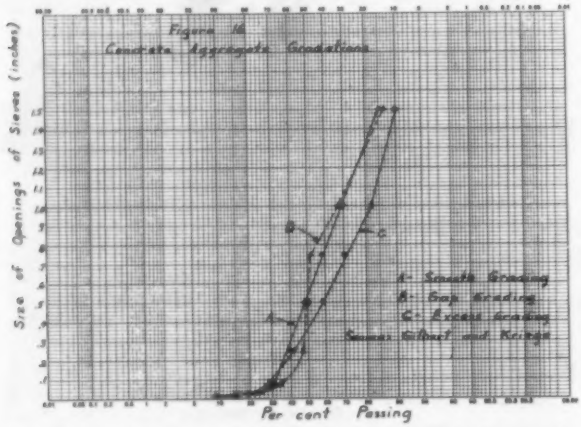


Fig. 16: Concrete aggregate gradations, the curves illustrating smooth grading, gap grading and excess grading

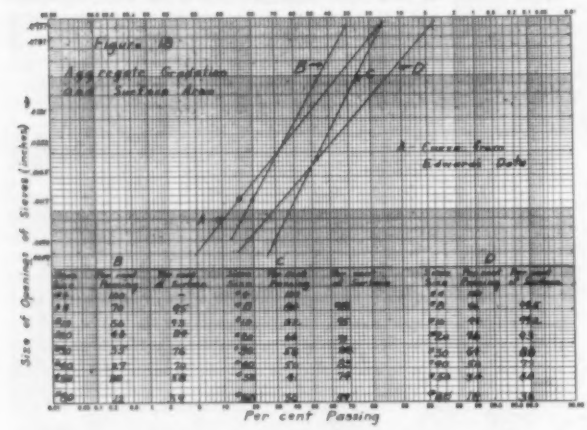


Figure 18
Aggregate Gradation and Surface Area
Size of Openings of Sieves (inches)
Per cent Passing
A- Curve from Edwards Data

Fig. 18, to the left: Curves which show the importance of the fine material in contributing to the surface area of the total aggregate

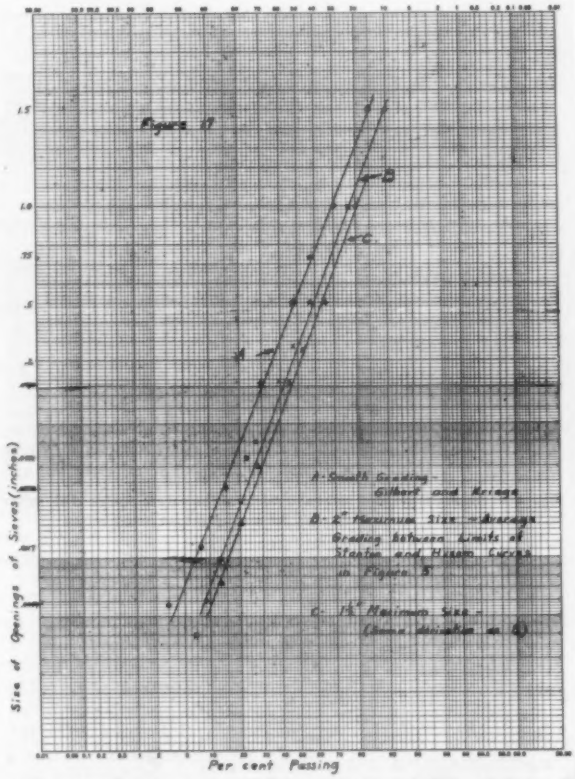


Figure 17
Size of Openings of Sieves (inches)
Per cent Passing
A- Smooth Grading - Gilbert and Kriege
B- 2" Maximum Size - Arranged Grading Between Limits of Starke and Hudson Curves in Figure 5
C- 1½" Maximum Size - Same Variation as B

Fig. 17: Combination of the arithmetic- and logarithmic-probability scale for concrete aggregate gradations

when the grading curve has a slope such as that which is approximately the same for aggregates *A*, *B*, and *D*, but for decreased slopes such as with aggregates *E*, *F*, and *C*, the tensile strength is low. The compressive strength appears to depend not only on the slope of the curve but also on the position of the curve. Thus, aggregate *A* has the highest compressive strength, but curves *B* and *D* with similar slopes have lower compressive strengths than aggregate *A*. Aggregates *C*, *E*, and *F* have both slope and position variations and show much lower compressive strengths than aggregate *A*. These relations may not have the same significance for different cement: aggregate ratios.

With regard to Portland cement concrete, Gilbert and Kriege[15] have pointed out that irregularities in the distribution curve of coarse and fine aggregate have been accepted as undesirable. They also advocate that irregularities are also undesirable in the combined aggregate and indicate that there is usually a lack of particles of about the ¼-in. size in the combined fine and coarse aggregate. Gilbert and Kriege presented charts for smooth grading, gap grading, and excess grading of aggregates. Corresponding arithmetic-probability grading curves are shown in Fig. 16. The differences in the gradings are readily interpreted by the types of curves obtained. Gilbert and Kriege also measured the transverse and compressive strengths of concretes made from these aggregates:

STRENGTH OF THE CONCRETE

	Transverse					Compression	
Grading	7 Days	14 Days	28 Days	3 Months	6 Months	7 Days	28 Days
Smooth	542	618	720	924	899	2796	4182
Gap	509	584	669	805	755	2212	3277
Excess	522	638	750	778	837	2296	3517

A comparison of the strength data and the grading curves indicates that the strength of the concrete increases as the grading curve approaches a straight line relation. Another interesting observation is that the transverse strengths of the smooth grading and the gap grading has decreased after the sixth-month period, whereas the excess grading is still showing an increase in transverse strength. This may be a result of a difference in the fineness of the aggregates as indicated in Fig. 16 by the position of aggregate *C* (excess grading) as compared to that of aggregates *A* and *B* (normal and gap gradings). It would be extremely interesting to have data illustrating the effect on the strength of concrete with aggregates having probability grading curves of straight line relations but with variations in slopes and positions of their grading lines.

The discussions and figures up to this point have indicated that aggregates of sand sizes of suitable gradings tend to follow a logarithmic-probability relation, whereas aggregates of gravel sizes of suitable gradings tend to follow an arithmetic-probability relation. Obviously, for an aggregate having a grading consisting of both sand sizes and gravel sizes as in Portland cement concrete and bituminous concrete, a portion of the grading will follow an arithmetic-probability relation, whereas the other portion of the grading will follow a logarithmic-probability relation. This is apparent in Fig. 16,

(Continued on page 100)

Sly Dust Filter in a Connecticut rock crushing plant for the suppression and positive collection of dust created by crushing, screening and conveying operations. The same filter is shown in the entire view of plant below.

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QUICK, DEPENDABLE SHIPMENT

Fort Dodge Limestone Co. devotes 95% of its capacity to production of agricultural limestone. Mine stone 120 ft. below surface level

By HERBERT E. SWANSON

General view of plant. Two belt conveyors transport stone from primary crusher to secondary crusher and screens

Eight Spreaders Promote Farm Sales

DUE TO THE INCREASING DEMAND by the farmers in the northern part of Iowa for agricultural limestone, two fleets of four spreaders each are now being operated by the Fort Dodge Limestone Co., Fort Dodge, Iowa. Changes in the methods of operating existing crushing and screening equipment, through manipulation of chutes, etc., have enabled this company's plant to increase its production of agricultural limestone to 95 percent of its total capacity. Normal capacity is 50 tons per hour. Practically all the agricultural limestone is delivered under A.A.A. contracts.

Eight spreaders are in use, which are charged from the plant bins or stockpiles, for servicing farmers in the immediate vicinity. Farms are serviced anywhere within a radius of 100 miles and, for long hauls, a truck-mounted crane accompanies each fleet for loading the spreaders. The crane and the fleet of spreaders travel to the job site over the highways on long hauls and the stone is shipped by rail, thus necessitating speedy handling at the destination. This is accomplished by the crane, which can load a 6-ton capacity spreader in from six to eight minutes. The crane is mounted on an International truck and has a ⅜-cu. yd. clamshell bucket on a boom with a three-quarter swing, which operates by power take-off from the truck motor.

The spreaders, with New Leader Lime Spreading boxes manufactured by the Highway Equipment Co., are mounted on five International and three Ford trucks. Each fleet is capable of spreading three carloads of agricultural limestone per day. The spreaders are operated by power-take-off from the truck motor, and will discharge for a distance of 20 ft. on each side in spreading the agstone.

Limestone Is Mined

The limestone produced at this plant has a calcium carbonate equivalent of 96 to 97 percent and easily passes physical tests for soundness and quality. It is mined from a 53-ft. strata using the conventional room-and-pillar system. The mine floor is 120 ft. below the surface but only 20 ft. of this seam is available for excavation, the remaining 33 ft. being left as the ceiling. Above this seam of high grade limestone, there is a 3½-ft. bed of clay, then 17 ft. of hard sandstone, 17 ft. of poor quality limestone, 9 ft. of sandstone, 3 ft. of hard limestone and 9½ ft. of

(Continued on page 102)

Left: Hammermill with hinged cover raised to inspect mechanism is used to make agricultural limestone. Right: One of a fleet of trucks with special bodies and spreading equipment

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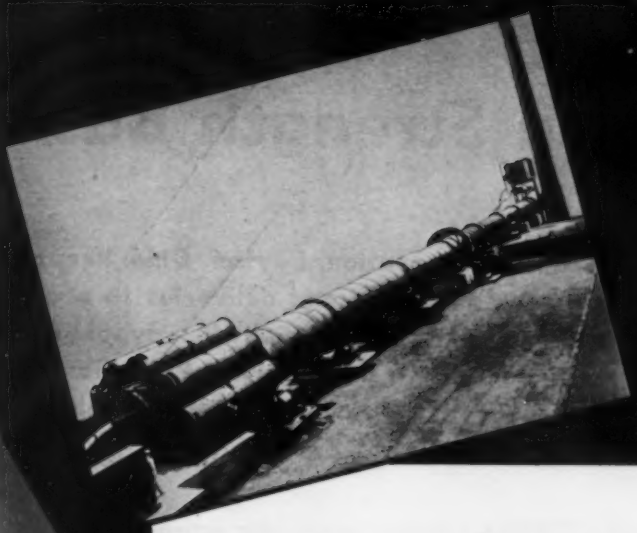

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Ready Mix

Selling Concrete on Strength Basis

Batching plant and office of Ready Mixed Corporation. Cement elevator may be seen in the foreground, and on the other side of the plant are the elevators for sand and gravel. Agitator truck receiving batch from mixer

Ready Mixed Corporation, Dayton, Ohio, keeps a close check on orders and deliveries to promote customer good-will. Sell ten types of "certified concrete," and operate 21 agitator units and a central batching and mixing plant

PRIOR to 1931, while engaged in the construction business, A. W. Kimmel was always concerned with the stereotyped concrete specifications usually winding up with a compressive strength requirement. A careful study of concrete designs ensued which resulted in the determination of Mr. Kimmel to set up a ready mixed concrete operation wherein all concrete would be sold on a guaranteed strength basis. Thus strength concrete, known locally as "Certified Concrete" was introduced to Dayton for the benefit of all users of concrete.

The Ready Mixed Corporation, organized in 1931, has a central mixing plant specializing in ten types of concrete, each designed to serve a particular purpose. Each of these types can be had in regular concrete, high-early-strength, with lime or calcium admixes, or with pea gravel. Sand-cement topping in both regular and high early is available in the heavier strengths.

The words "Certified Concrete" have been registered with the office of the Secretary of State in Ohio for the exclusive use of the Ready Mixed Corporation, in the Dayton area. "Certified Concrete" appears directly under the firm name on all of the concrete agitators, on the letterheads and envelopes, and on every piece of printed matter used by the company. The words have been given a definition by concrete buyers in and around Dayton who use them in specifying a quality product.

Sell on "Strength" Basis

Marketing strength concrete was successful from the start. Contractors and other concrete buyers saw the advantage of ordering a mix to fill a definite need. It has simplified a procedure dealing with a highly technical subject requiring specialized knowledge. Concrete buyers in the Dayton area are now accustomed to buying, with confidence, so many cubic yards of concrete of a given strength: 5000 p.s.i for machinery and heavy floors; 4500 p.s.i for bridge work, paving and machinery bases; 4000 p.s.i for durable floors and certain kinds of paving; 3500 p.s.i for swimming pools, foundations, drives and sidewalks; 3000 p.s.i for reinforced buildings, lighter driveways and walks; 2500 p.s.i for walls, floors, light foundations and light walks; 2000 p.s.i for footings, house walls and garage foundations; 1500 p.s.i for duct work and light grout; 500 p.s.i for special grout for duct work.

To safeguard against mixing errors the bin scales are checked every morning. The operator starts his day by balancing the scales with all weigh batchers empty. As a further check daily screen tests to check gradation of aggregates are made by the Bowser-Morner Testing Laboratory in Dayton. Systematic compressive strength tests also are made by this laboratory on all sizeable pours. These reports are carefully filed away as they come in. All cement is laboratory tested before shipment.

In the hands of a user of limited experience concrete can be mishandled. Therefore an office girl telephones the local weather bureau every day to get the 8:00 a.m. temperature reading. This is noted on a graph chart, a record that dates back to the beginning of the business. This becomes an important record in reconstructing the conditions to which a particular batch was subjected should the user report poor results. It isn't often that the occasion arises but there have been times when the weather chart and the laboratory have been used to place responsibility where it belongs.

The mix used in the various strengths is ample to allow a safe margin for overloading, but since there may be a liability involved the company has carried a "Product Insurance" policy for many years. The policy, issued by the Travelers Insurance Company, has never had to pay off.

Pricing Methods

Mix prices are always quoted for delivery within the city limits. Special quotations are made for hauls beyond the limits of Dayton. All orders of less than a cubic yard are charged at the full cubic yard rate when the haul is five or more miles from the plant, plus a charge of one dollar for the hauling. When the customer's truck picks up an order, a deduction of $1 per cu. yd. is allowed. All Sunday and overtime deliveries are made with the understanding that there will be an additional charge of $1 per cu. yd. A dis-

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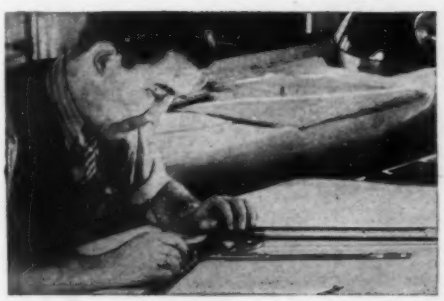

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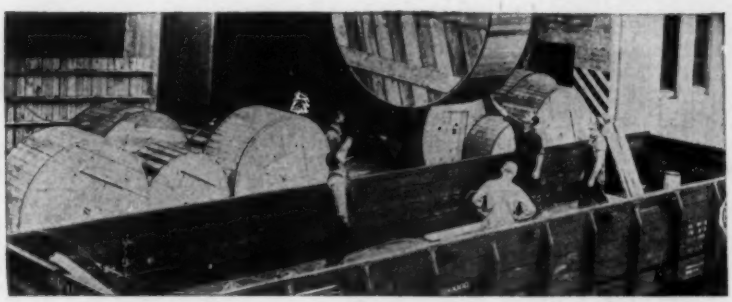

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count of 5c per cu. yd. is allowed for payment of the order within ten days of delivery.

Cost Records

Accurate records faithfully kept and frequently consulted provide the controls that sustain a business. The Ready Mixed Corporation keeps a cost record. Both weekly and monthly payroll, overhead, and other costs divided by the total cubic yardage produced in these periods provides the cost of making one cubic yard of concrete during a given period. This is carried along further to each truck unit. By combining the cost of the driver and the truck and dividing by the total cubic yardage hauled during a given period and dividing by the total mileage given, the cost per truck of hauling one cubic yard of concrete in each of the 21 transit agitators is obtained. These cost records on a weekly and a monthly basis are important to establish values in a fluctuating business. A carefully kept log showing the cost of repairs and the gasoline consumption of each truck has proven itself in checking pilferage and in plugging leaks. The log affords an index to the kind of handling each truck is getting.

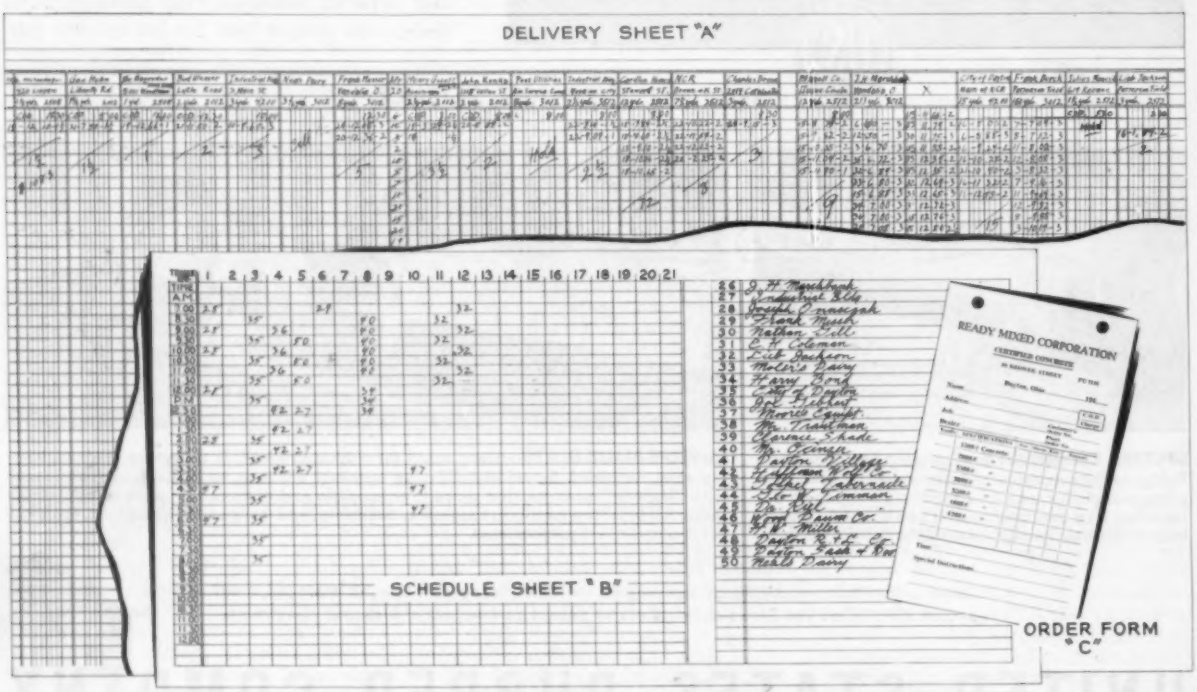
In practice the Ready Mixed Corporation has found that accurate cost records have solved many personnel problems. The cost system also has improved the human-relations-in-business situation. Efficient drivers and others like to work in a tidy environment. They have also discovered that keeping costs in line does not necessarily lower the wage scale. Satisfaction is evidenced by the average length of service of employes, many of whom have been with the company since its earliest days.

A good reputation in the ready-mixed concrete business depends on the uniformity of a quality product and the manner in which delivery promises are kept. Delivery failures have caused more trouble for ready-mixed concrete operators than anything else. No one has yet found a way to placate a contractor who, with forms set and a crew waiting, has been held up because the concrete didn't arrive at the time that it was promised. Another source of annoyance for a contractor is to make all the preparations to have the concrete delivery fit into a schedule and then find that he can't get the delivery on the day and hour that he wants it. The chances are that the ready-mixed concrete operator could have made the delivery on time in normal times if he had had a scheduling sheet set up that would have provided for delivery on advanced dates.

Delivery Records

Both of these causes for friction can be overcome by having a pad of 21 column analysis sheets, such as an accountant uses in making an audit. These sheets can be ruled in a manner that will show the truck numbers running consecutively across the top and the hours in the day running down the left side. One sheet could be used each day and enough sheets ruled up to provide for advanced or future deliveries. The names of the customers to be served each day are listed by name on the right side of the sheet and the names keyed with numbers. These numbers then are listed opposite the promised time of delivery under the number of the truck that will make the delivery. A glance at the sheet tells the whole operating story. Since this method has been in operation the Ready Mixed Corporation has had few delivery failures. Futures can be promised with the full realization that the deliveries will be made.

When the phone girl accepts the order she immediately makes out an order form. This goes to the dispatcher's desk. He then schedules the delivery on the schedule sheet. Then he sets up a column for the customer on a delivery sheet. Like the schedule sheet, the delivery sheet is also a 21-column auditor's analysis pad. The column heading will show the customer's name, the delivery point, the amount of the order, and the numerical designation of the mix. It will show the rate per cubic yard and indicate C.O.D. deliveries and open accounts. As the order is filled a notation is made of the transit agitator number, the time the de-



Forms used to keep a close check on mixer truck schedules and deliveries. Delivery sheet (A) shows customer's name, delivery point, amount of order, mix, rate per cubic yard, transit agitator number, time of delivery, and cubic yards carried. Schedule sheet (B) shows agitator truck number, time order should be delivered and key number of customer. List of customers and key number to the right. Order form (C), on right

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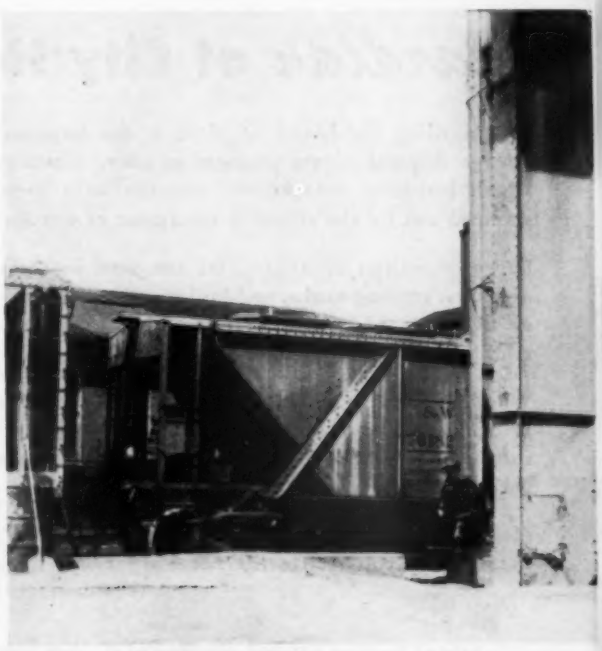
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS



Left: Agitator unit receiving batch from mixer overhead. Note receiving hopper to prevent spillage. Right: Cement is received in bulk and moved by screw conveyor and bucket elevator to cement bins above

livery left the plant, and the cubic yardage carried.

Quite frequently the original order will call for an amount in excess of the cubic yardage delivered, or it may be that the customer underestimated his needs and required more concrete than his original order specified. These variations show up when the deliveries are totaled at the end of the day. The method justifies itself by eliminating errors which can be costly to the company and aggravating to the customer.

The driver stops his empty concrete agitator alongside the dispatcher's office and comes to the desk to receive the order that the dispatcher has filled out on an autographic register. After time stamping the two copies they are handed to the driver who then moves his agitator under the mixer spout. While the truck is moving into place the dispatcher gives the plant operator the quantity of the load and the numerical designation of the mix. The operator then calls back and repeats the order. If he has heard it correctly that ends the matter, if not the dispatcher repeats the order and gets the verification. The mix has been prepared by the time the driver is ready to receive it. The driver gets a delivery signature on the original, leaves the copy with the customer. Back at the office the original is again time stamped and a record is kept of the time consumed in making the delivery.

The present plant was designed and built by the Butler Bin Co., and erected in 1937 on a 100- x 300-ft. lot situated along a railroad siding not far from the business district. Cement is received in railroad bulk cars and unloaded by screw conveyor to the boot of an 8-in. bucket elevator, 65-ft. centers, emptying into the storage bin. The two cement storage bin compartments each have 300-bbl. capacity.

Bin Level Indicators Speed Up Material Handling

Sand and gravel trucks dump into hoppers on the opposite side of the structure. Two Columbus bucket elevators take the sand and gravel to an 85 ft. height and dump into bins. The sand bin holds 65 cu. yd. while the 1½-in. gravel bin will take 70 cu. yd.; the ¾-in. gravel bin 70 cu. yd., and the pea gravel bin 30 cu. yd. Overflow in all of the bins is prevented by a bin level indicator. When bin capacity is reached a light comes on in the bin operator's compartment and he throws a switch that stops the bucket conveyor feeding that bin. At the same time a light comes on at the cement unloading conveyor to let the man there know that his bin is full. Lights over both the sand and gravel hoppers warn dump truck drivers not to unload until the lights go out indicating that the bins are ready to receive more material.

Material is batched to the specifications of each order. All material and water is first weighed and then dropped into a 2-cu. yd. Rex mixer and dumped into the loading hopper. The loading hopper is adjustable to both high lift and low dump transit agitators.

While Mr. Kimmel keeps in touch with the overall operations, the active management of the business is under the direction of E. R. Bonner. Mr. Bonner came into the business nine years ago as a transit mixer truck driver. Now at the age of 32 years years he is in full charge of all operations.

The business of the company is well established. The reputation of the company for prompt, efficient service is well known. Mr. Bonner says that the best form of advertising for a well grounded ready-mixed concrete business is a neat appearing agitator rolling down the street. With 21 such agitators moving in every direction every day, all well painted and trim, the name of the company and the words "Certified Concrete" can be seen by almost everybody in Dayton.

Need Houses in Chile

CHILE has need today for 300,000 new homes and more will be needed to keep pace with the country's industrial development, according to Dr. Urbano Yanes, visiting Chilean physician who is in the United States taking advanced studies in public health under the inter-American training program sponsored by the Institute of Inter-American Affairs. This seems to point to a good market for concrete block and pipe machinery in Chile.

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Transport Rock Asphalt from Quarry to Mill by Aerial Tram and Trucks

Rock Asphalt Co. of Utah has largest deposit of natural rock asphalt in the United States

By J. F. PRUYN

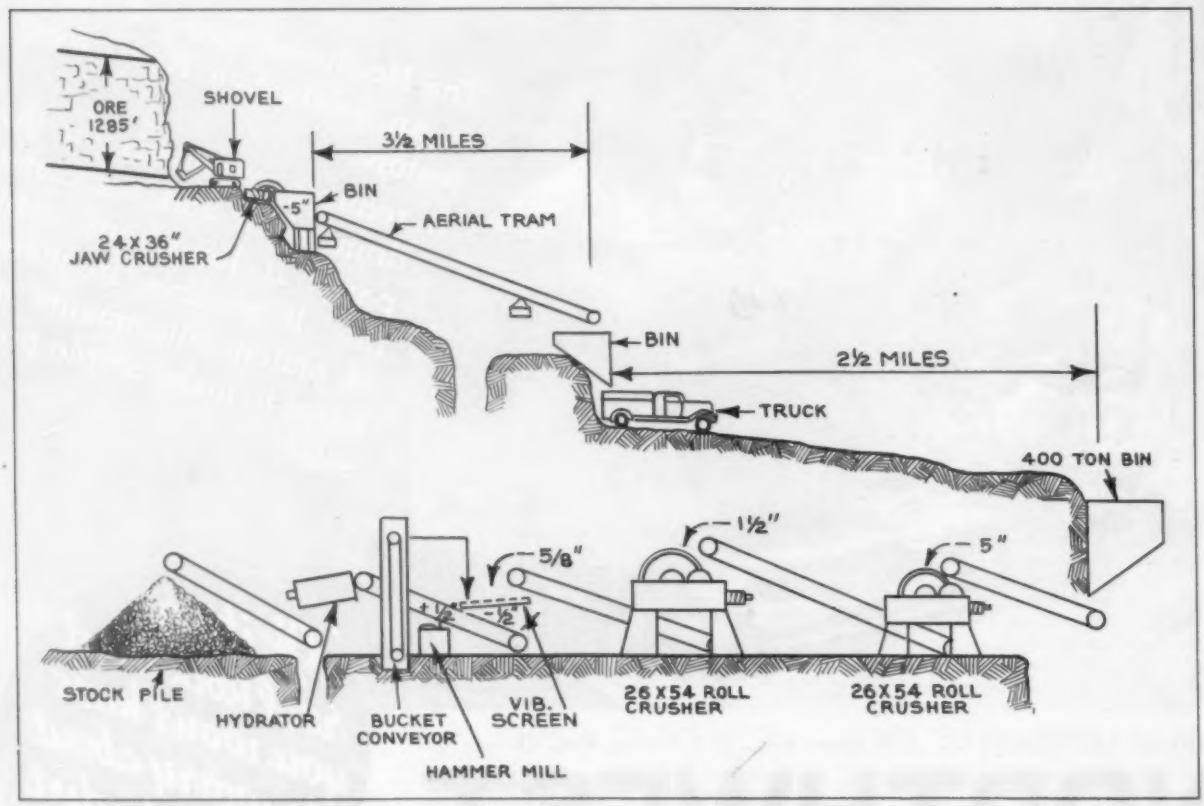
Aerial tramway, 3½ miles long, which carries material from the primary crusher bin near quarry to truck bin, 2½ miles from plant

MANY who walked the Main Street of the Century of Progress, Chicago, never realized they were treading on natural rock asphalt from perhaps the largest and richest deposit in the United States, and possibly in the world. An 800-million ton body of this material lies up the canyon, just a few miles from Kaiser's and Colorado Fuel Company's coal mines in Sunnyside canyon, Utah. If all of this deposit were used, it would make three 60-ft. roads around the globe.

This great deposit is the property of the Rock Asphalt Company of Utah which is owned and operated by Howard C. Means and Henry Jones.

It is said that rock asphalt was used in building the roads of Macedonia. Much later the French rediscovered its utility by accident. They

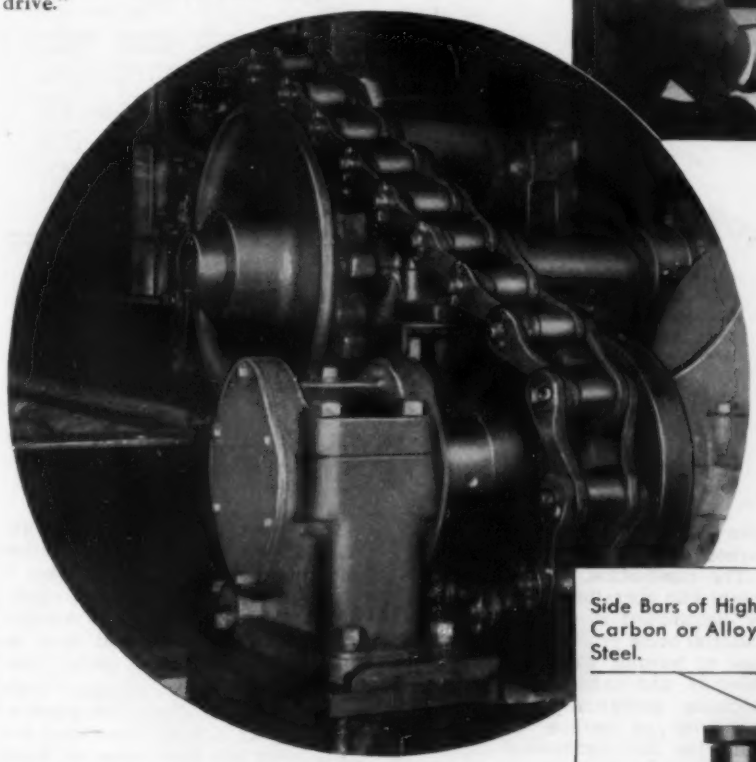
(Continued on page 103)



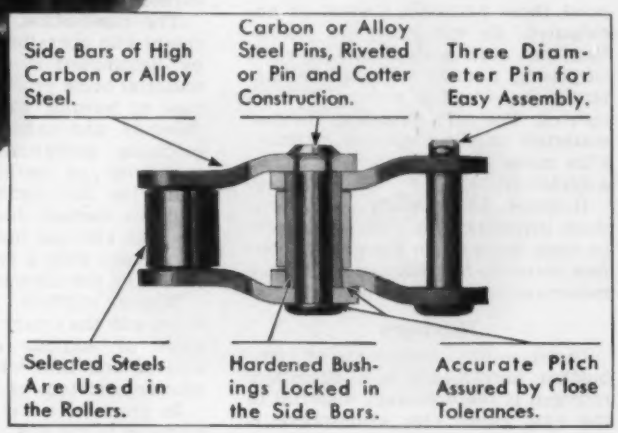
Flow diagram showing how rock asphalt is processed from quarry through screening and crushing plant

WE CALL THAT OUR PLEASURE DRIVE

❶ "I STILL HAVE THE JITTERS when I think of that old drive we had," this operator told me. "Always breaking down right in the middle of a big rush job . . . never really operating right, it was the headache of the whole plant. We never got real production till we decided to put in that Chabelco chain belt drive."



❷ "DID IT EVER FILL THE BILL! Why, that chain belt runs so smoothly the boys call it the 'pleasure drive.' And it not only operates better, but it has lasted far longer. Let me tell you, with the conditions under which it operates . . . dusty, dirty, never getting the right attention or lubrication . . . it's a miracle it runs at all. How come that Chabelco chain drive is so good?"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Three Diameter Pin for Easy Assembly.
Selected Steels Are Used in the Rollers.
Hardened Bushings Locked in the Side Bars.
Accurate Pitch Assured by Close Tolerances.

❸ "LOOK AT THIS DIAGRAM," I told him. "Look at that three-diameter pin with its milled ends that prevent it from turning in the side bars. Note the offset side bar construction, the high finished, case hardened bushings locked in the side bars and the other quality Rex features. It's built tough for tough service. That Rex design means far longer life and greater service."

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Efficient Rotary Kiln Operations

Part 7: Recovery of by-product chemical compounds from rotary lime kilns

By RALPH GIBBS*

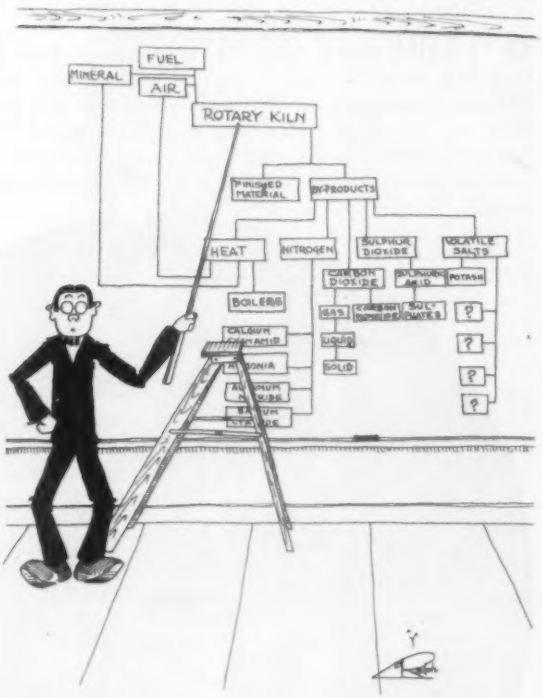

Chart shows present by-product possibilities from kiln exit gases and indicates others may be discovered

SINCE ROTARY KILNS are used in conjunction with a combustion process, the products of combustion offer a large field for their utilization and development. Although some installations use oil or gas as fuel, the majority are using bituminous coal and thus produce a kiln exit gas rich in carbon dioxide and nitrogen. These substances generally predominate in the usual rotary kiln operation while there are other minor constituents such as sulphur dioxide and volatile inorganic compounds.

Notable among the inorganic compounds volatilized in certain rotary kiln operations are those of potassium and some units of the cement industry have recovered potash from the exit gases of rotary kilns.

To the writer's knowledge no serious or extensive study has been made of the materials that might be found in the exit gases of rotary kilns beyond those normally present or anticipated. He will hazard a prediction that such a study will reveal a surprising number of valuable materials that could be economically recovered. The very nature of the raw materials usually processed in rotary kilns make such a prediction almost a certainty.

However, since much work along these investigational lines remains to be done, we must for the present confine ourselves to a discussion of those materials we know are present.

Nitrogen

Under normal conditions of combustion and rotary kiln operation, nitrogen is the dominant material in the exit gases. Our atmosphere is composed of approximately 21 percent of oxygen and 78 percent of nitrogen with about 1 percent of such gases as argon, krypton, xenon, carbon dioxide and helium. Thus, with the perfect combustion of carbon with the oxygen of atmosphere gas, we can have an exit gas from the kilns containing 21 percent of carbon dioxide and 78 percent of nitrogen. However, commercial fuels are not 100 percent carbon so that in general practice the combustion products contain less than 21 percent of carbon dioxide.

The combustion products in most rotary kiln operations are augmented by decomposition products of the material being processed. Thus in the case of burning lime and clinkered dolomite and cement, or any such calcining operation considerable quantities of carbon dioxide are added to the combustion products and the carbon dioxide content of the exit kiln gas may be as high as 45 percent with a corresponding decrease in the nitrogen content.

Where sulphide ores are being roasted in the rotary kiln large quantities of sulphur dioxide will be evolved and thus tend to reduce the nitrogen content of the exit gas.

In practically every case, however, nitrogen is the dominant material in the exit gas.

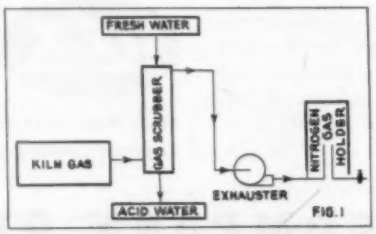

Fig. 1: Flow diagram for the production of commercial nitrogen from kiln exit gases

Fortunately, and in some way unfortunately, nitrogen itself is a rather inert material chemically, so that it is only under rather unusual conditions that it can be made to combine with other materials and thus be converted to some more useful form.

The recovery of nitrogen from rotary kiln gases should not prove to be extremely difficult. Scrubbing the gases with an abundance of fresh water will remove the carbon dioxide and sulphur dioxide and the finely divided particles of dust. If an extremely pure nitrogen is required, the commercial nitrogen can be compressed, liquefied and distilled to the desired purity.

Fig. 1 is a flow diagram for the production of commercial nitrogen.

This nitrogen can be made to combine with other substances under suitable conditions to form extremely useful and valuable compounds.

Thus at 1800-1900 deg. F. it will combine with calcium carbide to form calcium cyanamid. This process is used on a commercial scale in those sections of the country where calcium carbide is manufactured. It is not beyond the realm of fancy to believe that a plant, self contained, could be developed to produce this valuable commodity.

(Continued on page 88)

*Consulting chemical engineer.

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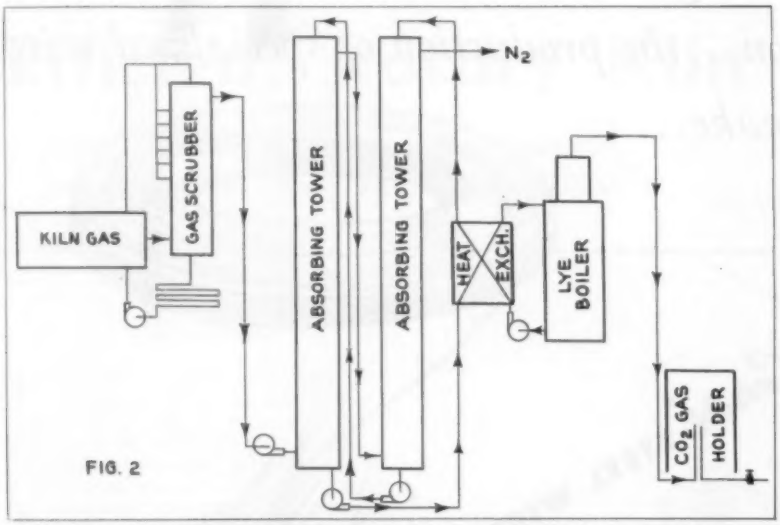

Fig. 2: Process for the separation and purification of the carbon dioxide in rotary kiln gases

Nitrogen in the presence of hydrogen and an adequate catalyst, and under suitable conditions of temperature and pressure will combine to form ammonia. The hydrogen generally is obtained from water gas or from the electrolytic dissociation of water.

In Serpek's process, a mixture of alumina and carbon are heated to 3000 deg. F. in the presence of nitrogen when aluminum nitride is formed. Aluminum nitride with water will form ammonia and alumina, the latter being returned to the process to repeat the cycle.

Another and older process is that in which barium oxide and carbon are raised to a high temperature in the presence of nitrogen when barium cyanide is formed. The barium cyanide can be decomposed by steam at approximately 850 deg. F. with the formation of ammonia, carbon monoxide and barium oxide, the latter being returned to the process for recycling.

These are only a few of the methods whereby the by-product nitrogen of exit rotary kiln gas can be converted to valuable products.

Carbon Dioxide

This substance has received much publicity in the past 20 years due largely to the commercial production of the solid variety which has such unique properties as a refrigerant. Almost daily we learn of new developments and applications where this substance finds new uses.

The calcining industries handle the greatest quantity of carbon dioxide produced by man, but they seem to evince little or no interest in its commercial recovery.

One 8- x 125-ft. rotary kiln burning lime with bituminous coal for fuel will exhaust 160 tons of carbon dioxide per day! Such waste is sheer folly.

The separation and purification of the carbon dioxide in rotary kiln gases is not a particularly difficult problem. Fig. 2 shows a flow diagram for such a process.

The exit gas from the kiln is first scrubbed with water to eliminate the sulphur dioxide and wash out the solid particles or dust. From the scrubber the gases, now substantially carbon dioxide and nitrogen, are passed to the absorbers where the carbon dioxide is extracted from the gas by a suitable solution.

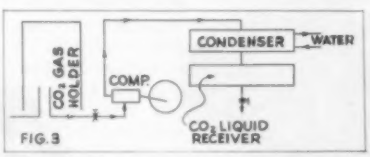

Fig. 3: Flow diagram of plant for the manufacture of liquid carbon dioxide

This solution for selectively absorbing the carbon dioxide can be composed of sodium or potassium carbonate, or even certain organic substances. Such organic solutions very effectively absorb carbon dioxide and triethanolamine is one of this family.

From the absorbers come the unabsorbed nitrogen and the carbon dioxide-bearing solution. The nitrogen, substantially pure, can be utilized as described under that heading.

The solution of carbon dioxide passes through heat exchangers to the lye boiler where the temperature is raised to the boiling point and the pure carbon dioxide is driven out of solution and collected in a gas holder for further processing. The weak absorbing solution is returned to the absorbers and thus repeats its cycle.

The diffusion method of separating nitrogen from carbon dioxide is worthy of further investigation.

Producing Liquid and Solid CO_2

In the manufacture of liquid carbon dioxide it is only necessary to compress the above carbon dioxide to its corresponding pressure. The critical temperature of carbon dioxide is about 89 deg. F. so that its temperature must be below this to obtain the liquid variety. Fig. 3 shows the flow diagram of the liquid carbon dioxide plant.

Fig. 4 is a flow diagram of a solid carbon dioxide plant where only the basic equipment is shown.

In the separation of carbon dioxide from the nitrogen, usually the previously mentioned solutions are used for the absorption of the gas. There are, however, other possibilities such as the case of separating the calcium oxide from magnesia of dolomitic lime. Fig. 5 is a flow diagram for such a process whereby the lime is separated from the magnesia and pure carbon dioxide also is produced.

In this process the soft burned dolomitic lime is slaked to a slurry and pumped into the extractors. The exit kiln gases are scrubbed with water, and then they too are pumped into the extractor. In the extractors the carbon dioxide combines with the hydrated lime to form insoluble cal-

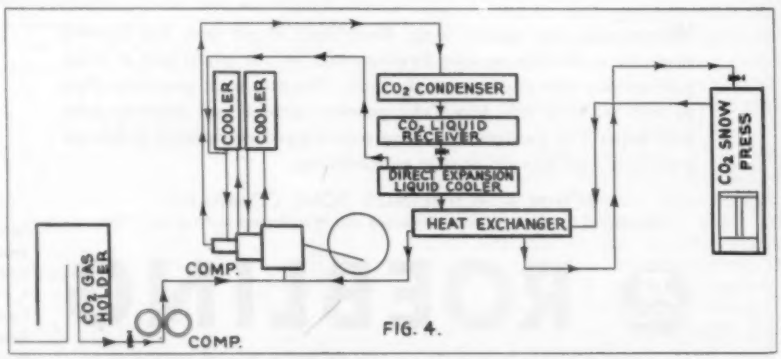

Fig. 4: Basic equipment in solid carbon dioxide plant shown in flow diagram

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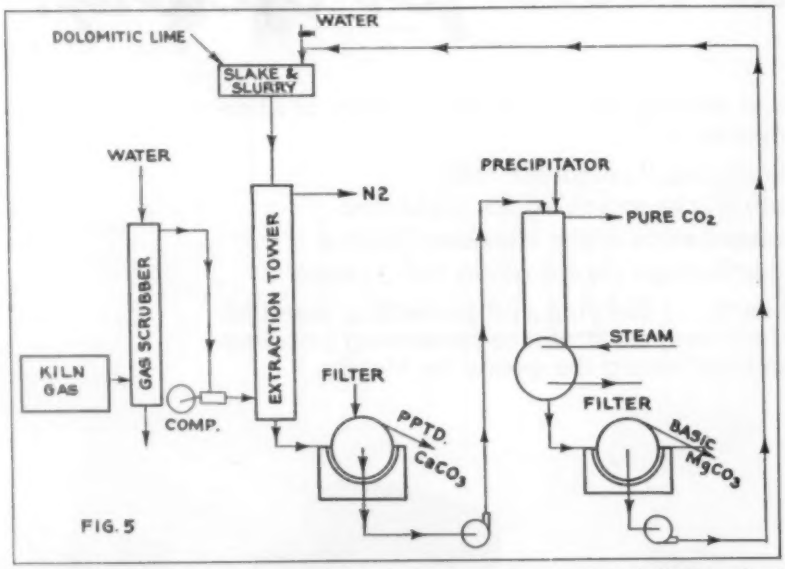

Fig. 5: Process in which lime is separated from magnesia, and pure carbon dioxide is produced

cium carbonate while the magnesia forms the bi-carbonate which is soluble in the solution of carbonic acid.

The solution of magnesium bi-carbonate with the suspended insoluble calcium carbonate is passed from the extractors to the filters where the insoluble calcium carbonate is removed.

The solution containing the magnesium bi-carbonate in solution now goes to the boiler where its temperature is raised to the boiling point and the half-bound carbon dioxide is driven out of solution. In so doing, the magnesia is precipitated as basic magnesium carbonate. This suspension of the basic magnesium carbonate is passed from the boiler to another filter where the solid basic magnesium carbonate is removed. The spent solution is returned to the slaking vats for recycling.

In this process we have obtained the following products: 1. nitrogen; 2. precipitated calcium carbonate of high purity; 3. carbon dioxide; and 4. basic magnesium carbonate of high purity.

Thus can we produce pure carbon dioxide either for liquefaction, solidification, or any of the multifold purposes for which carbon dioxide is used. In some instances the carbon dioxide is returned to the system at the extractors since the amount of magnesia that will be held in solution is proportional to the partial pressure of the carbon dioxide in solution.

Attempting to separate the carbon dioxide from the nitrogen by high pressure and liquefaction has not proved commercially successful. Very high pressures are encountered and this means high power costs. Furthermore, there appears to be some difficulty in securing the expected liquefaction of the carbon dioxide in the presence of so much inert nitrogen.

Carbon Monoxide

Carbon monoxide, the notorious toxic product of the internal combustion engine, has been brought into disrepute because some people, tired of living, insist upon its use for self-extinction.

Carbon monoxide, truly dangerous to the existence of red-blooded life, is rather a versatile raw material and its further possibilities as an industrial raw material have not been exhausted. It is generally the result of the incomplete combustion of carbon.

It seems possible that by recycling rotary kiln exit gas through a bed of carbonaceous material with a proper supply of air, just sufficient to bring about the reduction of the carbon dioxide, an excellent fuel gas will result. This thought has been aroused by the following relations*:

(a) $C + O_2 = CO_2 + 94{,}300$ cal.
(b) $2C + O_2 = 2CO + 53{,}000$ cal.
(c) $C + CO_2 = 2CO - 41{,}000$ cal.
(d) $2CO + O_2 = 2CO_2 + 135{,}000$ cal.

From (a) above we see that 32 gram mols. of oxygen will combine with 12 gram atoms of carbon to form 44 gram mols. of carbon dioxide and liberate 94,300 heat units.

(b) tells us that 32 gram mols. of oxygen will combine with 24 gram atoms of carbon to form 56 gram mols. of carbon monoxide and liberate 53,300 heat units.

(c) shows that 44 gram mols. of carbon dioxide will combine with 12 gram atoms of carbon to form 56 gram mols. of carbon monoxide and in so doing will *absorb* 41,000 heat units.

(d) tells us that 32 gram mols. of oxygen will combine with 56 gram mols. of carbon monoxide to form 88 gram mols. of carbon dioxide and liberate 135,300 heat units.

Equation (b) shows the chemical action which produces carbon monoxide and liberates 53,300 heat units. Equation (c) shows the absorption of heat necessary to reduce carbon dioxide to carbon monoxide which is 41,000 heat units. Thus, if there were no thermal losses, the burning of 24 gram atoms of carbon with 32 gram mols. of oxygen will produce sufficient heat to reduce approximately 56 gram mols. of carbon dioxide to 73 gram mols. of carbon monoxide.

Thus we will have produced a total of 56 gram mols. of carbon monoxide by (b) and 73 gram mols. of carbon monoxide by (c), a total of 129 gram mols. of carbon monoxide.

Equation (d) tells us we now have available 312,000 heat units in the resultant gas.

Chemical Raw Material

Carbon monoxide can be produced from carbon dioxide without the inclusion of atmospheric nitrogen, and will be of such purity that it will find uses as a raw material for the making of many chemical substances. The synthesis of methanol is brought about by combining carbon monoxide and hydrogen under the proper conditions. Many other organic compounds have been synthesized from carbon monoxide and no doubt many more applications will be developed.

Increase Magnesite Production

NORTHWEST MAGNESITE CO., Chewelah, Wash., operated their seven kilns at near capacity during 1943, according to a report by the U. S. Bureau of Mines. Part of the magnesite was concentrated by flotation. The calcined product is used principally for maintenance grade refractories while some of the regular output and the flotation concentrates were used for refractory brick production. Bureau of Mines reports 754,832 tons of crude magnesite were mined in 1943 as compared to 497,368 tons in 1942.

Acid-Proofing Wood

WHERE ACIDS are used, as around flotation or chemical reduction plants, wood soon rots. This wood can be acid-proofed by simply painting with silicate of sodium. After it sets, wash the board with dilute sulphuric acid.

*"Principle of Chemical Engineering," Walker, Lewis & McAdams, 1937 Ed., p. 173.

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Chemists' Corner

Available Lime-Silica Ratio

By JOSE E. BERROCAL*

ALTHOUGH there are several ratios and formulae to judge proper ratios of limestone to clay in slurry, not one of them (to the knowledge of the author) is based on the obtainable compound composition of the cement, as modern manufacturing control and specification of cement require.

A given chemical analysis of slurry may be calculated to clinker and from the obtained clinker analysis the corresponding obtainable compound composition may be calculated, but this method is tedious and it does not provide a clear and practicable control "device."

The available lime-silica ratio formulae which is derived in this article provides a key to judge the proper proportioning of clay and limestone having in view a fixed ratio of C_3S to C_2S.

The data used in this formulae is the SiO_2 to R_2O_3 ratio and the CaO to $SiO_2+R_2O_3$ ratio; the former or silica ratio in connection with Fe_2O_3 to Al_2O_3 ratio, give a very good idea of the quality or composition of the clay to be used while the lime ratio shows clearly the proportion of the two raw materials in the mixture. With the use of the proposed formulae, these two ratios are combined in terms of a given C_3S to C_2S ratio, having the advantage that being based on ratios it may be applied to slurry, clinker or cement.

For the purpose of this work, the term "Available Lime-Silica Ratio" (A.L.S.R.) means the ratio of lime to silica after deducting lime combined with Al, Fe, SO_3, and that remaining free of combination.

It is obvious that to a given "Available Lime Silica Ratio" there corresponds a fixed C_3S to C_2S ratio, and therefore controlling the mix to a fixed $\frac{\text{available CaO}}{SiO_2}$, the C_3S to C_2S ratio is also controlled.

Let $S = \frac{S}{I} = \frac{\%\ SiO_2}{\%\ Fe_2O_3 + \%\ Al_2O_3}$ = silica ratio

Let $L = \frac{L}{I} = \frac{\%\ CaO}{\%\ SiO_2 + \%\ R_2O_3}$ = lime ratio

$$L = \frac{L}{\frac{S+I}{S+I}} = \frac{L}{\frac{S}{S+I} + \frac{I}{S+I}}$$

Being $\frac{I}{S+I}$ the R_2O_3 part in $\frac{S}{I}$

Let C = factor to obtain CaO which combines with Fe_2O_3 and Al_2O_3 to form C_4AF and C_3A. (The value of C changes with $\frac{Al_2O_3}{Fe_2O_3}$ ratios. Where this ratio changes much, a ready reference table may be calculated.)

Then $\frac{I}{S+I}C$ = calcium oxide to combine for C_4AF and C_3A.

Let F = free lime percentage total CaO.

Then $\frac{LF}{100}$ = uncombined lime.

Let $G = SO_3$ percentage total CaO.

Then $\frac{LG \times 0.7}{100}$ = lime combining with SO_3 to form $CaSO_4$.

$$\therefore \quad \frac{L - \frac{C}{S+I} - \frac{LF}{100} - \frac{LG \times 0.7}{100}}{\frac{S}{S+I}} =$$

$$\frac{L - \frac{C}{S+I} - L\left(\frac{F+0.7G}{100}\right)}{\frac{S}{S+I}} = \text{available lime-silica ratio.}$$

In control work to judge slurry mixes, fixed values for F and G may be adopted ($K = \frac{F+0.7G}{100}$) simplifying the formulae to

$$\frac{L - \frac{C}{S+I} - LK}{\frac{S}{S+I}} = \text{A.L.S.R.} \quad \text{or} \quad L = \frac{\text{A.L.S.R.} \times \left(\frac{S}{S+I}\right) + \left(\frac{C}{S+I}\right)}{(I-K)}$$

$$\text{or} \quad S = \frac{C + LK - L}{L - LK - \text{A.L.S.R.}}$$

To make use of this formulae in controlling the mix, lime-ratio is kept constant by keeping $CaCO_3$ constant, and the clay is blended (using stoichiometric principle) to the corresponding silica ratio calculated by A.L.S.R. formulae.

To determine the A.L.S.R. corresponding to a given C_3S/C_2S ratio the following derived formulae may be used:

$C_3S = 3CaO + SiO_2$
$1.325x = 0.976x + 0.349x$
$C_2S = 2CaO + SiO_2$
$1 = 0.651 + 0.349$

Based on the above equations

$$\frac{C_3S}{C_2S} = \frac{1.325x}{1}$$

$$\text{then } x = \frac{C_3S}{1.325\ C_2S}$$

$$\text{A.L.S.R.} = \frac{0.976x + 0.651}{0.349x + 0.349}$$

$$= \frac{0.7366\left(\frac{C_3S}{C_2S}\right) + 0.651}{0.2634\left(\frac{C_3S}{C_2S}\right) + 0.349} = \frac{2.796\left(\frac{C_3S}{C_2S}\right) + 2.471}{\left(\frac{C_3S}{C_2S}\right) + 1.325}$$

It is obvious that if tables or curves are calculated to show relations of $\frac{C_3S}{C_2S}$ to A.L.S.R. and lime ratio to silica ratio, the work may be largely simplified.

NOTE:

$C = 1.295$ (this value changes with $\left(\frac{Al_2O_3}{Fe_2O_3}\right)$

$F = 2.963$ (for 67.5% CaO and 2% free lime clinker).

$K = \frac{F+0.7G}{100} = 0.03033$ (for $G = 0.1\%\ SO_3$.

*Chief chemist, Puerto Rico Cement Corporation, Guaynabo, P. R.

(Continued on page 94)

One name stands out

PIONEER

From the day when the first Pioneer Portable gravel plant was towed to a road-side pit to produce aggregate for Wisconsin's specifications, one name has stood out. In pit, quarry and mine you see the name Pioneer on gravel plants, washers, crushers, screens, conveyors, bituminous plants. Pioneer leads in the qualities that make equipment pay.

Pioneer stands for sensible, simple engineering—design that meets the job requirements—rugged construction for rugged work—low maintenance costs.

That these dependable qualities are present in greater measure in Pioneer equipment is manifest by the many contractors who year after year have relied exclusively on Pioneer.

Pioneer is proved equipment — and the right combination of Pioneer units will make more money for you. Pioneer engineers are ready to help you now.

Pioneer
ENGINEERING WORKS
Jaw Crushers · Roll Crushers · Screens · Conveyors · Feeders · Washers
MINNEAPOLIS 13, MINNESOTA

ENGINEERS and MANUFACTURERS of QUARRY · GRAVEL AND MINING MACHINERY

EXAMPLES

Given a C_2S/C_3S ratio = 1.50, to calculate corresponding A.L.S.R.

$$\text{A.L.S.R.} = \frac{2.796x\,\frac{C_2S}{C_3S} + 2.471}{\frac{C_2S}{C_3S} + 1.325}$$

$$= \frac{2.796 \times 1.50 + 2.471}{1.50 + 1.325}$$

$$= 2.358$$

Knowing the A.L.S.R. = 2.36 and willing to work with lime ratio 2.15, to calculate silica ratio:

$$S = \frac{C + LK - L}{L - LK - \text{A.L.S.R.}}$$

$$= \frac{1.295 + 2.15 \times 0.03033 - 2.15}{2.15 - 2.15 \times 0.03033 - 2.36}$$

$$= 2.872$$

Or if knowing a A.L.S.R. (2.358) and silica ratio (2.872), to calculate lime ratio:

$$L = \frac{\text{A.L.S.R.} \times \frac{S}{S+I} + \frac{C}{S+I}}{1 - K}$$

$$= \frac{2.358 \times \frac{2.872}{3.872} + \frac{1.295}{3.872}}{1 - 0.03033}$$

$$= 2.148$$

Lime in 1943

BUREAU OF MINES final annual figures on lime for 1943 show that total sales of "open market" lime advanced to 6,596,615 short tons, a new annual record that exceeded the former high set in 1942 by eight percent. Sales of agricultural, chemical and refractory (dead-burned dolomite) lime gained over the 1942 tonnages, but sales of building lime declined appreciably.

LIME SOLD BY PRODUCERS IN THE UNITED STATES, 1942-43, BY USES

Use	1942 Short Tons	1942 Total Value	1943 Short Tons	1943 Total Value	1943 Average Value
Agricultural	400,631	$ 2,518,953	454,133	$ 3,134,661	$6.90
Building:					
Finishing	281,227	$ 2,688,734	191,425	$ 1,790,001	$9.35
Mason's	295,037	2,536,952	267,092	2,234,494	8.37
Other	121,413	947,519	99,441	829,775	8.34
	697,677	$ 6,173,205	557,958	$ 4,854,270	$8.70
Chemical and Industrial:					
Carbide and cyanamide	202,518	$ 1,114,447	355,092	$ 2,297,924	$6.47
Glassworks	190,580	1,402,674	208,166	1,534,777	7.37
Insecticides and disinfectants	66,332	507,730	75,125	616,410	8.21
Metallurgical:					
Steel flux	1,171,082	7,508,445	1,174,654	7,840,972	6.68
Ore concentrat'n[1]	318,436	1,942,098	680,343	4,693,911	6.90
Other	87,079	639,780	45,471	339,111	7.46
Paper mills	606,440	4,049,884	543,335	3,753,502	6.91
Tanneries	78,746	549,828	69,222	509,005	7.35
Water purification	335,877	2,327,177	395,830	2,897,009	7.32
Other	719,036	4,815,586	760,561	5,349,759	7.03
	3,776,126	$24,857,649	4,307,799	$29,832,380	$6.93
Dead-burned dolomite	1,229,357	$10,817,634	1,276,725	$11,243,017	$8.81
Total lime[2]	6,103,791	$44,367,441	6,596,615	$49,064,328	$7.44
Hydrated lime included in above distribution	1,293,339	10,290,304	1,313,388	10,447,050	7.95

[1] Includes flotation, cyanidation, bauxite purification, and magnesium manufacture.

[2] Includes lime used by producers (captive tonnage) as follows—1942: 427,635 short tons, valued at $2,239,152; 1943: 434,571 tons, $2,457,795.

Demand for quicklime increased substantially whereas that for hydrated lime rose only slightly in 1943. Net mill realization advanced 17c over 1942 to $7.44 per ton in 1943.

Increasing costs of materials, fuels, labor and repairs closed some small plants during 1943, but offsetting this, five portland cement plants were converted in part in 1943 to the calcining of lime, and, a sixth, planned to start production early in 1944.

Total demand for chemical lime gained sharply in 1943 as a result of the completion and start of production in many new war plants with large requirements for lime. Big increases in demand for lime were noted in metallurgical, carbide, glass, insecticides, and water-purification industries.

Post-War Outlook

The outlook for "open-market" lime in the post-war period is encouraging owing to some newly developed or greatly expanded uses and to increased sales to process industries that will be meeting an expectedly large backlog of civilian demand. Steel, the largest consuming industry, doubtless will require more lime for flux and refractory purposes than in the pre-war period; however, the annual requirements will be decidedly lower than during wartime. A similar situation prevails with regard to lime for carbide and alumina manufacture. The new uses in production of magnesia from sea water and of magnesium by the ferrosilicon process will have only slight upward effects, as most of the lime used in these industries fails into the captive classification. Lime requirements of the paper, glass, insecticide, water-treatment, and tanning industries doubtless will be high in the post-war era. Growing recognition of the importance of lime as a plant food and the easier availability of supplies through reopening of the many small lime plants shut down for the war should result in moderately increased consumption for agricultural purposes. The large volume of deferred construction, expected when war restrictions are removed, doubtless will raise sales of building lime well above the pre-war tonnages. All factors point toward at least a moderate gain in demand for "open-market" lime over the pre-war levels.

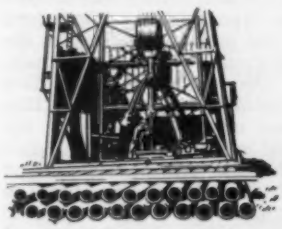
Produce Pulp Stone

MCMILLAN MINING AND QUARRY CO., a subsidiary of the Roche Harbor Lime Company, Roche Harbor, Wash., has opened up a new quarry project on Texada Island, which will include crushing and grinding equipment for the production of agricultural limestone, limestone flour, and "pulp" stone for the paper trade.

For the new dump trucks, shovels, compressors, locomotives, or the various other heavy-duty construction and material handling equipment you are planning to buy, specify Cummins Diesel power. Practically all of the leading manufacturers offer this diesel as optional equipment.

In the Northwest Woods, Cummins Diesels do the complete job —from show to siding. They power yarders, loaders and tugs . . . trucks that handle up to 240,000 pounds (three carloads). In this service, Cummins Diesels are the symbol for "cheap logs."

In the commercial fishing fleets of the Pacific, Atlantic and Gulf coasts, and in all types of work boats and pleasure craft, Cummins Marine Diesels—propulsion engines and generating sets alike—have become a byword for dependable, low-cost performance.



In the vast Mid-Continent area, the world's greatest oil producing territory, Cummins Dependable Diesels power more rotary and cable tool drilling rigs and oil well service units than any other make of diesel engine.

Step by Step

Tremendous weight and size greatly limited the uses of early-day diesels. Twenty-six years ago, the builders of Cummins Diesels decided to do something about that—and did! Step by step, and with *each step first tested and proved on the job*, they simplified design . . . improved construction processes . . . turned to lighter, stronger materials . . . steadily boosted the rpm. That, briefly, is the story of the modern Cummins Diesel . . . the *original high speed diesel* that, since 1932, has won its spurs on the toughest, heavy-duty jobs . . . in virtually all types of heavy-duty equipment, automotive, industrial, marine. For tomorrow, continued refinements in diesel manufacture promise a Cummins Dependable Diesel that will do your job still cheaper, still faster, still longer. So plan now to standardize on Cummins Diesel power for the equipment you will build or operate after the war. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

Sand Recovery

(Continued from page 57)

readers to become familiar with the relationship of figures and chart; and (2) because we believe in most cases in the field, correction of sand gradation is actually a cut-and-try process.

Mathematical Approach

However, as we have noted above, there is a more direct mathematical approach, as described in ROCK PRODUCTS, October, 1942, p. 60, "Sand Blending," by Fred C. Bond, and a subsequent exchange of explanatory letters between Mr. Bond and Stanton Walker, published in the March, 1943, issue, p. 55.

The simplest analysis to start with is to attempt to raise our percentage of minus 50-mesh to the mean of that in the specification, namely 17.5 percent. Let x equal the unknown amount of our material, which 5.2 (all of the present minus 50-mesh) divided by x will equal 17.5 percent, the mean of 10 to 25 percent passing the 50-mesh.

$$\frac{5.2}{x} = 17.5$$

$$x = \frac{5.2}{17.5} = 29.7 \text{ percent}$$

In other words we would have to discard all but about 30 percent—that is waste 70 percent—of our raw material to bring the minus 50-mesh up to 17.5 percent.

The sieve analysis and the chart show that the material that ought to be removed is in the minus 16-mesh plus 50-mesh product, which is 80.5 percent of the whole product. In other words we would have to discard seven-eighths or 87 percent of this part of our raw material.

Of course this would not be feasible unless concrete sand was a secondary product and the minus 16-mesh plus 50-mesh had a large market, which it probably wouldn't have as a mortar sand without a considerable proportion of minus 50- and 100-mesh.

Suppose, in order to use round figures, we retain one-third and waste two-thirds of these excess sizes. There is 42.1 percent of minus 16-mesh plus 30-mesh and 38.4 percent minus 30-mesh plus 50-mesh. The amounts being nearly equal, take out, let us say, two-thirds of each, which would give us approximately a sieve analysis of:

Plus 4-mesh	0 parts
4- to 8-mesh	3.1 parts
8- to 16-mesh	11.2 parts
16- to 30-mesh	14.0 parts
30- to 50-mesh	13.0 parts
50- to 100-mesh	4.7 parts
Minus 100	0.5 parts
Total	46.5 parts

Change this to percentages by multiplying by 2.16 (approximately 46.5 x 2.16 = 100), and we obtain:

PERCENTAGES (Sizes)		PERCENTAGE PASSING	
Plus 4-mesh	0	No. 4	100.0
4- to 8-mesh	6.6	No. 8	93.7
8- to 16-mesh	24.1	No. 16	69.6
16- to 30-mesh	30.1	No. 30	39.5
30- to 50-mesh	28.0	No. 50	11.1
50- to 100-mesh	10.1	No. 100	1.1
Minus 100-mesh	1.1		
Total	100.0		

This is not very bad sand but it comes out with a less percentage of minus 50-mesh than wanted (because we did not discard enough of the "belly"), and yet we have thrown out more than half the whole feed, because this minus 16-mesh plus 50-mesh size group constituted 80.5 percent of the whole, and we have wasted ⅝ of 80 percent, and thus 53 percent or more than half our entire feed material; but the product is still short on minus 50-mesh and minus 100-mesh and also short on plus 16-mesh.

Of course, if we are going to add materials to our sand to make up for these deficiencies, we must know the sieve analyses of those materials that we add. Therefore we will have to assume that we have a fine material, and a coarse material, and

(Continued on page 98)

ROAD shocks that bounce and jar the drum . . . strains from pulling over uneven ground on the job . . . can be mighty expensive to truck mixers if transmitted directly to the transmission, power plant and other vital working parts.

REX MOTO-MIXERS are protected against such damaging road shocks by the exclusive chain belt drive that goes completely around the drum . . . providing a cushion that absorbs all shocks and strains . . . assuring minimum repairs and maintenance.

In fact, so important, so valuable is this chain drive that REX MOTO-MIXER owners say that this one feature alone—*and there are many others*—would be enough to make REX MOTO-MIXERS their choice.

Other important advantages of REX MOTO-MIXERS? The Rex end charging hopper, the exclusive Hi-Lo mixing action . . . 100% accurate water system . . . 5-in-1 Quint Spout, and many other features that make Rex the leader in the truck mixer field. For complete information about the chain belt drive and the other outstanding Rex features, send for your free copy of Bulletin 405. Write Chain Belt Company, 1649 W. Bruce St., Milwaukee 4, Wis.

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REX CONSTRUCTION MACHINERY

Control SAND MOISTURE

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TO CUT TIME & COST IN MIXING

and to make BETTER

CONCRETE

NO cement contractor wants variation in the moisture content of the sand he uses — because moisture variation either produces concrete of uneven quality or adds time and cost in mixing — or both. Show him that you can supply sand with uniform moisture and you have something more than sand to sell him.

AKINS Classifiers are well adapted mechanically for controlling moisture and are especially suited to washing sands to close specifications, such as required for glass making. AKINS Classifiers do not require unloading after shutdowns. Power and upkeep requirements are very low, considering the high tonnages handled.

LET US WORK WITH YOU ON POST WAR PLANS.

SKINNER MULTIPLE HEARTH ROASTER

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COLORADO IRON WORKS *Company*

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Sand Recovery

(Continued from page 96)

that these have the following sieve analyses:

	PERCENT PASSING			
Size	Raw	Cor-rected	Fine Ad.	Coarse Ad.
No. 4	100.0	100.0		100.0
No. 8	96.9	93.7		50.0
No. 16	85.7	69.6		0.0
No. 30	43.6	39.5	100.0	
No. 50	5.2	11.1	75.0	
No. 100	0.5	1.1	25.0	

This means, of course, that the fines are all minus 30-mesh, 75 percent minus 50-mesh and 25 percent minus 100-mesh; the coarse is 50-50 in the plus 8-mesh and plus 16-mesh sizes. Such materials would probably have to be independently prepared, as in fact they were in the case under discussion. The fines and the coarse additions are sometimes in the product and may be recovered by proper means, or they may have to be made by grinding sand for fines and crushing gravel for the coarse.

It is hopeless to try to correct this raw sand by a purely extraction process because as has been shown we could only use one-quarter or one-third of it, so we will work on the partly corrected product which is nearly half raw sand, with the excess minus 16-mesh plus 50-mesh removed. We want to know how much to use of the new coarser sand, passing the 4-mesh and retained on the 16, 50 percent between 4-mesh and 8-mesh and 50 percent between the 8-mesh and the 16-mesh. The mean of the specification is 55 percent passing the 16-mesh instead of 69.6, which our partly corrected sand now has.

Referring now to the breakdown of sizes in this partly corrected sand, in which proportions are shown by percentages, we want to increase the plus 16-mesh sizes from the present 30.7 percent to 45 percent, or by approximately 50 percent.

Turning now to the breakdown of sizes in proportions, or parts, instead of percentages, we find we have $\frac{14.3}{46.5}$ parts in this size group (4-mesh to 8-mesh and 8-mesh to 16-mesh). We want to increase this by $\frac{7.2}{46.5}$ or by approximately 50 percent, which now gives us $\frac{21.5}{46.5}$ parts in all.

Of course our additions will change the divisor, 46.5, and hence the final percentages somewhat, so that we know in advance it is useless to deal with exact figures or to expect the exact results designed.

Since the coarse material added was split 50-50 between the minus 4-mesh plus 8-mesh and the minus 8-mesh plus 16-mesh, we will add $\frac{3.6}{46.5}$ parts to each fraction.

In the case of the fine material to be added, we want to increase the percentages in the minus 50-mesh group from 10.1 to 17.5 percent, or approximately a 70 percent increase. Since we have $\frac{5.2}{46.5}$ parts in this size group, by the addition of 70 percent more fines we will have approximately $\frac{5.2 + 3.5}{46.5}$, or $\frac{8.7}{46.5}$ parts in our new sand, of which ¾ of the added $\frac{3.5}{46.5}$ parts is minus 50-mesh plus 100-mesh and ¼ is minus 100.

Revising our already partly corrected sand with these changes we have:

SIZES IN PARTS		SIZES IN PERCENTAGE
Plus 4-mesh	0	0
4- to 8-mesh.....	6.7	11.7
8- to 16-mesh....	14.8	25.8
16- to 30-mesh...	14.0	24.5
30- to 50-mesh...	13.0	22.7
50- to 100-mesh..	7.4	13.0
Minus 100-mesh ..	1.4	2.3
	57.3	100.0

(Continued on page 99)

Of course refueling a battleship doesn't come under the services rendered by an aggregate company . . . but the hose used in Sand and Gravel plants and Rock-crushing plants must be just as rugged and resistant to wear and punishment as that we supply the navy for refueling a battleship.

Cincinnati Hose like its well known companion products, Cincinnati Conveyor and Transmission Belts, has been highly successful on all kinds of jobs. You can count on *Cincinnati* for dependable service . . . always.

THE CINCINNATI RUBBER MFG. CO.
CINCINNATI, OHIO

CINCINNATI
CONVEYOR AND TRANSMISSION BELTS · HOSE

Our new sand will now have the following sieve analysis:

	PERCENT RETAINED	PERCENT PASSING
4-mesh	0	100
8-mesh	11.7	88.3
16-mesh	37.5	62.5
30-mesh	62.0	38.0
50-mesh	84.7	15.3
100-mesh	97.7	2.3
	293.6	

Fineness Modulus = 2.94

Summarizing, we have thus obtained an excellent concrete sand, within the specification limits (Fig. 4) but a little weak yet in the minus 4-mesh plus 8-mesh. This could very readily be remedied if necessary by changing the proportions of the coarse material addition from 50-50 to 60-40.

To obtain this sand we have, in approximate terms, thrown out a little more than half of the raw feed and added $\frac{10.7}{46.5}$ parts or about 23 percent of new material in the form of $\frac{7.2}{46.5}$ in new coarser sand and $\frac{3.5}{46.5}$ finer sand, or 15 and 8 percent, respectively.

Briefly, what we have done is to first discard 53 percent of our feed material and then recover and use from this discarded material enough to bring our total to better than 58 percent. In other words our recovered material was 23 percent of our corrected sand, which in turn was 46.5 percent of the feed $(53 \times 0.23) + 46.5 = 58$ percent.

It is obvious that this is one of many solutions, and we have used it because it analyzes very closely the mathematics that must have been involved in the solution of the particular plant problem which will be described in the next installment. There are cases probably where it might be economical to waste more than half the raw material, or at least to remove it from the concrete sand; for, if it were like this case, the more removed, the less will be the percentages of fine and coarse material to be added. In the case in point, and probably in most cases, both the fine and the coarse materials are already in the raw material, but are controlled more readily by taking them out and adding them again in separate operations, or separate devices, rather than to attempt to manipulate a single device to give a single desired product, which is certainly difficult to do in any operation where the proportions of the various sizes have to be changed radically, as in this case.

Keep Carbide from Slaking

WASTE due to slaking of carbide can be reduced to nothing by simply sprinkling the carbide with kerosene.

PUMP PARTS *Replacement Cost* LESS THAN 1/4¢ PER TON...

...ON THIS

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Medium-Duty Dredging Pump

after pumping 150,000 tons of fine coal

The job was at the inlet of a fine-coal-washer in the St. David, Ill., plant of the United Electric Coal Company. Water supply was limited. That meant a high solids ratio for economical operation. Actually the solids ranged from 34% to 35% by volume, with the particle size minus 1/16". The pump delivers 1200 GPM of this mixture, and handles about 4 times the rated solids output for this size of pump.

After a total delivery of 150,000 tons of coal, the major wearing parts of the pump showed only moderate wear. The parts replacement cost was estimated at less than 1/4c per ton.

LONG LIFE DUE TO SPECIAL, WEAR-RESISTANT MORRIS "FLINTMETAL"

Morris "Flintmetal," a special low-chrome alloy with a Brinell hardness around 700, is responsible for the remarkable wearing qualities of this pump. Unmachinable except by grinding, it outlasts gray iron from four to five times, and it is used by Morris in place of today's synthetic rubber linings which are not holding up as well as pre-war gum rubbers.

● Morris Slurry and Dredging Pumps are making remarkable records for efficiency, long wear and low cost in hundreds of applications. Write today for performance tables, specifications, requirements and other data on pumps suited to the particle sizes, densities and volumes of the material you have to handle.

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MORRIS CENTRIFUGAL PUMPS

Evaluating Aggregate Gradations

(Continued from page 72)

in which the material above No. 10 mesh size for the smooth grading is represented by a straight line grading curve. In order to obtain a straight line for a single curve for both the sand and gravel sizes, it is possible to use a combination of the arithmetic-and logarithmic-probability scale as in Fig. 17. No. 10 mesh has been arbitrarily chosen for the critical dividing size between the two ordinate scales. Curve *A* is the grading line for the smooth graded aggregate from the data of Gilbert and Kriege, and curve *B* and curve *C* are the grading lines for the average gradings between the limits suggested by Stanton and Hveem (Fig. 5) for 2 in. and 1½ in. maximum sizes respectively.

It is obvious that any type of curve can be obtained with aggregate gradings by using the probability scale for cumulative percentages, but this is also true for the usual methods of plotting gradations. It does appear, however, that gradings which have the proper requisites for use in pavement mixtures give straight line probability relations over a large percent of the aggregate. The probability method of evaluation cannot represent the gradation to 100% because paving aggregates have a well defined maximum size limit. The fact that the 100% value cannot be placed on the graph having the probability scale should not be a disadvantage, since this value can be indicated numerically. The problem is the distribution of the various sizes in the aggregate. It is generally known also that the physical properties of paving aggregate are more effected by alterations in the medium and fine sized fractions than by variations in the largest sized fractions, such as the upper 10-15 percent of the aggregate. This may be illustrated by surface area, which is used in some instances for the determination of the amount of bitumen to add to aggregate. Edwards[9] has calculated the surface area of graded sand by estimating the surface area of each size fraction, and adding the surface areas of all the size fractions to obtain the total surface area. To make the calculations, the particles were assumed to be spherical and all sizes to have the same density. The surface area was calculated by using the weight of material, the number of particles per gram, and the density of the sand. The data in Table I obtained from Edward's data, and data given in Fig. 18 for three hypothetical gradings show the percent of the total surface area which is contributed by the various portions of the aggregate. (All calculations made from Edward's values for number of particles per gram.)

TABLE 1

Sieve Size	Percent by Weight Passing	Percent of Total Surface
No. 10	80%	96%
No. 20	55%	84%
No. 30	40%	72%
No. 40	25%	56%
No. 50	15%	38%
No. 80	5%	15%

The surface area per gram as calculated by Edward's method for the aggregate gradings represented in Fig. 18 are:

A—5.856 sq. in. per gram
B—5.677 sq. in. per gram
C—9.464 sq. in. per gram
D—9.112 sq. in. per gram

These surface area values were calculated for aggregate of which 100 percent was retained on the No. 100-mesh sieve. This means that the lower part of the curves are cut short as indicated in Fig. 18. If these aggregates were continuously graded into the finer sizes (less than .0059 in.) the surface area of the aggregate would be much higher, and can be calculated from the equation:

$$\log S = K - \log M + 1.1513 \log^2 r$$

where:

S=surface area per gram
K=logarithm of shape factor divided by density
M=50% size

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Recently the head of a large Aggregate Producing company in the West made this statement.—"I've always understood that Simplicity Gyrating Screens were good, but I didn't realize how good they are until after I installed that 4'x 10' triple deck screen in one of my plants. No other screen is one, two, three, when compared to a Simplicity. Hardly a day goes by without some one of my customers making some comment about how perfectly sized and cleaned my material now is. From now on its Simplicity screens for me—the best aggregate screen on the market."

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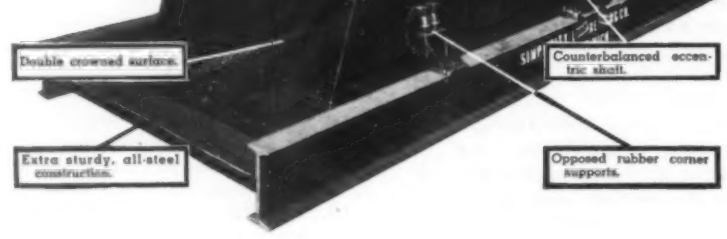


Simplicity

ENGINEERING COMPANY · DURAND MICH.

$$r = \frac{84.13\%\text{ size}}{50\%\text{ size}} \quad \text{or} \quad \frac{50\%\text{ size}}{15.87\%\text{ size}}$$

This equation gives for the surface of the aggregates of Fig. 18 (continuously graded and assuming sphere shaped particles):

A— 7.038 sq. in. per gram
B—10.43 sq. in. per gram
C—35.81 sq. in. per gram
D—10.175 sq. in. per gram

A comparison of these values, the values obtained by Edward's method, and the slopes and positions of the grading lines of Fig. 18 shows the importance of the fine material in contributing to the surface area of the total aggregate. Equations are available for calculating the surface area for aggregates which give straight line gradings with the arithmetic-probability method, provided the shape factor of the gravel or stone particles can be determined.

The possibilities indicated above by the application of the probability method to evaluating the particle size distribution of sands, gravels, mixtures of sand and gravel, and mixtures of aggregate and filler consists essentially of the following points.

(a) A straight line gradation may indicate a suitable grading of an aggregate. Deviations from a straight line may indicate undesirable properties.

(b) The slope and position of the grading line may indicate the applicability of an aggregate for various purposes.

(c) Sands of suitable grading tend to give straight line relations by plotting the diameters of the particles on a logarithmic scale and the percent by weight of material passing given sieve sizes on a probability scale.

(d) Gravels and stones of suitable gradings tend to give straight line relations by plotting the diameters of the particles on an arithmetic scale and the percent by weight of material passing given sieve sizes on a probability scale.

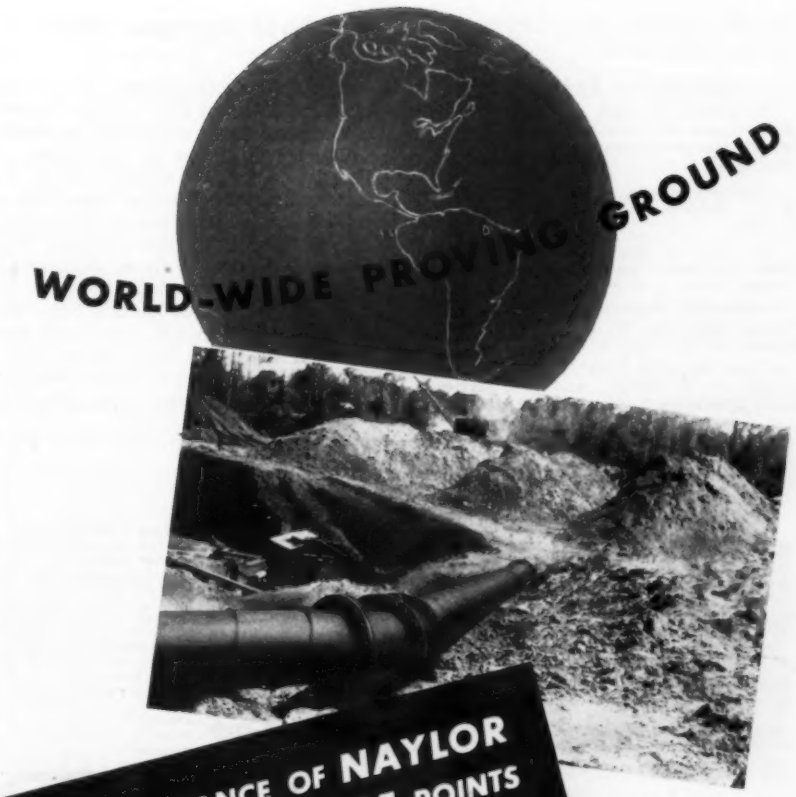
(e) Suitable mixtures containing both sand and gravel sizes may be plotted by the probability method by using a combination of the arithmetic and logarithmic scales (arithmetic scale for sizes above and logarithmic scale for sizes below a critical size).

Straight line grading curves with percentages plotted on a probability scale can be useful in calculating average diameters, number of particles per unit weight, specific surface area, and the curves can be defined by two statistical parameters:

(a) for logarithmic-probability grading curves, M=50% size and

$$r = \frac{84.13\%\text{ size}}{50\%\text{ size}} \quad \text{or} \quad \frac{50\%\text{ size}}{15.87\%\text{ size}}$$

(b) for arithmetic-probability grading curves, M=50% size and r=dif-



From North Africa to New Guinea—wherever there's a pipe line required to do the job—Naylor Pipe continues to demonstrate its performance advantages over ordinary light-weight pipe.

Through its exclusive Lockseam Spiralweld structure, this pipe gives you greater strength, leaktightness and safety to perform jobs normally requiring heavier-wall pipe. And along with these advantages, Naylor offers advanced methods of pipe line connection in simplified and far quicker coupling.

All these performance features can step up your production in the post-war period just as effectively as they are functioning today in war-time service.

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for Dredging • Hydraulic Sluicing • De-Watering
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ference between 50% size and the 84.13 or 15.87% size.

Literature References

[11]Physical Changes in Aggregates in Bituminous Mixtures under Compaction, M. F. Macnaughton. **Proc. A. A. P. T.** Jan., 1937, p. 7.

[12]Asphalt Roads, P. E. Spielmann and A. C. Hughes. **Edward Arnold & Co.**, London.

[13]A Type of Aggregate Graduation for Most Suitable Asphaltic Mixtures, R. Vokac. **Proc. A. A. P. T.** Jan., 1939, p. 86.

[14]Stability Experiments on Asphaltic Paving Mixtures, W. J. Emmons, **Public Roads**, 14:197, 1933.

[15]The "Missing Link" in Concrete Aggregate, L. C. Gilbert and H. F. Kriege, **Rock Products**, p. 55, June 21, 1930.

Promote Agstone Sales

(Continued from page 75)

topsoil. The limestone near the earth's surface is not suitable for excavation by open quarrying methods.

The only access to the mine is through a vertical shaft, 7 x 16 ft., and two balanced mine cages and a cable hoist are the means of conveying the stone to the surface. The mine is ventilated by a Sturtevant blower, which forces air through 8-in. well drill holes driven into the mine at the opposite end from the shaft. A 125 g.p.m. centrifugal pump direct-connected to a 10 hp. Century electric motor, pumps water from the mine through a 2½-in. pipe into a nearby creek.

The limestone is blasted in two 10-ft. benches, using a 120-cu. ft. Gardner-Denver air compressor in the mine for drilling with stopers and a 300-cu. ft. Sullivan air compressor on the surface for drilling horizontal drift holes. It is loaded in the mine by a ⅝-cu. yd. Austin Western Badger shovel into home made, two-ton capacity mine cars. Due to difficulty in obtaining new equipment, old steam boilers were utilized to make the cars. They are hauled over 35-in. gage track by a mine mule to the vertical shaft where they are elevated by the mine cable hoist, which is powered by a 35-hp. Wagner electric motor. All motors in the plant are individually driven electric motors with V-belt drive.

The cars, upon reaching the surface, are manually dumped, with the stone going into a 7½ Austin gyratory crusher, powered by a 50-hp. motor. From the crusher, a 24-in. belt conveyor, 65-ft. centers, transfers the stone to another 20-in. belt conveyor, 80-ft. centers, which transports it to the sizing screens. The belt conveyors run parallel to each other and in opposite directions in order to utilize the economies of belt conveyor transportation in a limited space, and each is driven by a 10-hp. motor.

Stone is sized over a 3- x 8-ft. Universal single-deck vibrating screen with 1½-in. sq. openings, powered by a 1-hp. motor. Oversize goes by chute to a 9- x 20-in. Austin reduction crusher, capacity 35 tons per hour, powered by a 40-hp. motor, which discharges to the same belt conveyors for re-circulation to the primary screen.

Stone passing through the primary screen is dropped to a 3- x 8-ft. Universal double-deck vibrating screen having ¼-in. sq. openings on the top deck and 3/16-in. sq. openings on the lower deck. Stone retained on the top deck (1½ to ¼-in), the 3/16 to ¼-in. stone, and throughs from the bottom deck, are chuted into three 50-ton capacity storage bins. Bins containing stone larger than 3/16-in., have chutes leading directly to a No. 3 Williams hammermill, powered by a 75-hp. motor, which recrushes the stone as desired into agricultural limestone. Stone is returned to the belt conveyors from the hammermill by a 9-in. screw conveyor, 10 ft. long, for recirculation to the vibrating screens.

Other chutes from the three bins provide for truck loading. A 4-cu. yd. International end-dump truck is used for stockpiling from bins. A Barber-Greene bucket loader, 16-ft. centers, with screw feed attachment, loads trucks from stockpiles. A ⅜-cu. yd. Byers crane is used to load railroad cars from the stockpile.

W. J. Welp, the owner and superintendent of the Fort Dodge Lime-

A ROLL CALL

Making a 200-mesh separation on phosphate washer debris: This 150' Dorr Hydroseparator is used by the International Minerals and Chemical Corporation at its Pebble Rock, Fla. plant. Picture illustrates an inexpensive method of installing a large hydroseparator in which the tank is almost entirely of earthwork construction. No tank is required, simply an excavation.

THAT SPEAKS FOR ITSELF

When you glance down the list shown on the right, you'll see that "every leading phosphate rock producer is a user of Dorr equipment."

Before building its straight rake classifiers, bowl classifiers, sizers, hydroseparators and thickeners, the Dorr Company made a thorough study of the equipment requirements and the duties involved in connection with the beneficiation of phosphate rock. Many of the special heavy duty types of machines have been developed solely for use in the phosphate fields.

LIST OF COMPANIES USING DORR EQUIPMENT IN THE PHOSPHATE MINING FIELDS

Florida Pebble Rock District Users of Dorr Equipment

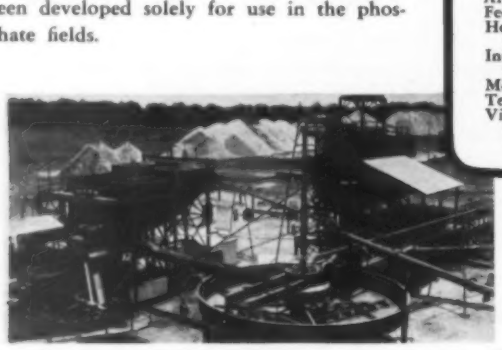
American Agricultural Chemical Company
American Cyanamid Company
Coronet Phosphate Company
International Minerals & Chemical Corporation
Pembroke Chemical Corp.
Phosphate Mining Company
Southern Phosphate Corp.
Swift & Co. Fertilizer Works

Florida Hard Rock District Users of Dorr Equipment

J. Buttgenbach & Company

Tennessee Phosphate District Users of Dorr Equipment

Armour Fertilizer Works
Federal Chemical Company
Hoover & Mason Phosphate Co.
International Minerals & Chemical Corporation
Monsanto Chemical Co.
Tennessee Valley Authority
Virginia-Carolina Chemical Corp.



Separating table feed from flotation feed at 65-mesh: At the Mulberry, Fla. plant of the International Minerals and Chemical Corp., this 40' Dorr Hydroseparator is used for making this fine sand separation.

Let us give you further information on any item in the line of Dorr equipment for phosphate mining.

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SUGAR PROCESSING
PETREE & DORR DIVISION
570 LEXINGTON AVE., NEW YORK 22

stone Co., has been a producer of crushed stone for over 20 years. He does not find it necessary to merchandise agricultural limestone in order to get business during these times, but is making effective use of educational literature in promoting the acceptance of agricultural limestone. As an example of the kind of literature he puts out, Mr. Welp is distributing reprints of the article, "Mobilizing the Fertilizer Resources of Our Nation's Soil," by Dr. William A. Albrecht, published in ROCK PRODUCTS, May, 1944, to township and county committeemen and to local bankers and others interested in the development of agricultural limestone application in his territory.

Mining Rock Asphalt

(Continued from page 84)

noticed the hard, durable surface left on the cobbled roads which resulted from asphalt being spilled and

View in rock asphalt quarry with shovel loading truck for transportation to primary crusher

rolled in by the freight wagons. Paris, in 1854, laid its first road of this material. Union Square, New York, was paved in 1872 with rock asphalt from Switzerland; this was the first use of this material in the United States. With the discovery of deposits in this country, rock asphalt has increased in use for roads and airports.

Description of Deposit

The asphalt, or bituminous sand stone, deposit of the Rock Asphalt Company of Utah consists of a 1300-ft. seam, extending approximately 17 miles up a steep canyon. The waste capping runs between 3 ft. and 50 ft. The 800 million tons of rock asphalt developed ranges between 9.5 percent and 12.0 percent bituminous.

Geologically, rock asphalt is a mixture of asphalt and sand compressed into a hard rock. The asphalt was formed from an oil with an asphalt base that accumulated in

(Continued on page 104)

Small Pumps Have Place in Dredging and Sand Wasting

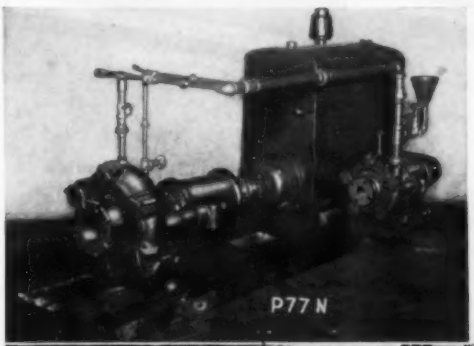
Amsco is a familiar mark on dredge pumps of the larger sizes but not so well known in the dredging field are Amsco-Nagle Industrial Pumps, although there are many logical waste handling and wash water circulating applications for them. There is no fundamental difference between an industrial material handling pump and a dredging pump except in range of sizes. Amsco-Nagle pumps are built to handle all types of abrasive materials, including sand and gravel, and have been advantageously used even in dredging operations.

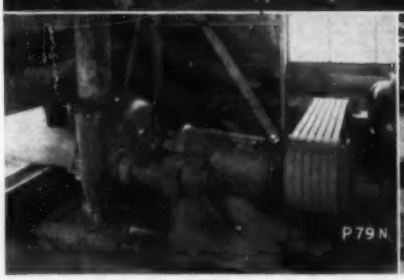
Picture P-77-N, for example, shows a 4" and a 1½" Amsco-Nagle pump driven by a single gasoline engine for dredging canals and channels by a midwestern state agency. The larger unit, which has a capacity of 400 g.p.m. and is designed for a head of 50', is the dredging pump. The smaller unit is used for priming the dredge pump and for supplying seal water to the stuffing box. The dredging pump is manganese steel-fitted, and its Class "D" impeller is selected to withstand abrasion and to allow the passage of oversize material and debris. This installation could be efficiently used for the production of sand and gravel.

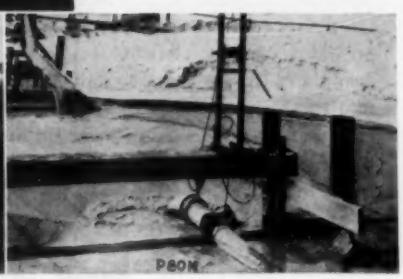
Picture P-79-N shows a 6" Amsco-Nagle pump used for the removal of waste sand, and P-80-N shows the suction end of the pump and the type of material being handled. (Simplicity of construction, accessibility of stuffing box and impeller are apparent in P-77-N.)

Within the past several years a number of Amsco-Nagle centrifugal pumps have been installed in gravel plants.

Write for Bulletin 940, showing the three vertical and two horizontal types of Amsco-Nagle Pumps.







The features of Amsco Renewable Lip Dippers are covered in Bulletin 641-D.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

AMERICAN Brake Shoe COMPANY

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

Mining Rock Asphalt

(Continued from page 103)

some form of geological trap overlaid and filled by a porous body of fine, even-grained marine sand. Heat and pressure volatilized the lighter fractions of the oil and left only the residual bituminous saturated sand. Further mild thermo and dynamic metamorphism resulted in a complete permeation of the silica sand with the asphalt, averaging 10 percent asphalt and 90 percent silica. Nature's efficiency in forming this deposit is evidenced by the uniformity of texture and bituminous content throughout the deposit.

Rock asphalt is mined by the open pit method. Approximately 4000-ton shots are obtained by drilling 16 to 18-ft. jackhammer holes and loading with 60 percent gelatine. Secondary shooting, block-holing, is done with 40 percent gelatine.

A 3½-cu. yd. shovel is used to load 5-ton trucks. The trucks service the bin that feeds a 24- x 36-in. Allis-Chalmers jaw crusher. All mine run is reduced to approximately 5 in.

From the primary crusher, the crushed rock is transported 3½ miles by a gravity, aerial tram to a point where trucks can transport the material the 2½ miles to the mill bin.

Owing to the ideal consistency of the deposit, only a size reduction to minus ½ in. is necessary before shipping. This simple crushing and screening operation is accomplished as follows:

As shown in the flow diagram, the crushed rock asphalt is drawn from the mill receiving bin, of 400 ton capacity, or a day's run, and transported by belt conveyor to two sets of 26- x 54-in. Allis-Chalmers rolls which reduce the 5-in. mine-run to 1½ in. and then to minus ⅝ in. The minus ⅝-in. material is fed to a ½-in. Tyler vibrating screen in closed circuit with a Williams hammer mill. The minus ½-in. is delivered to a hydrator and then stockpiled by a conveyor. Crushed rock asphalt is loaded in railroad cars by a conveyor running under the stockpile.

Add Moisture to Prevent Sticking in Cars

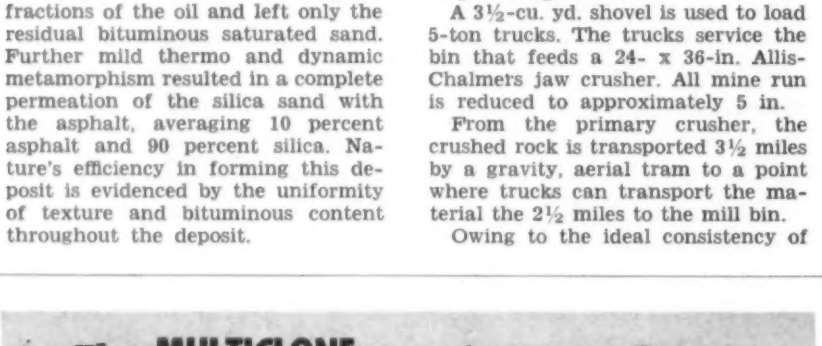
The hydrator is an interesting development that solved a lot of trouble. At the beginning of this operation, it was found that consumers had to re-mine the last foot of asphalt from the bottom of the shipping cars. This naturally did not please the buyer or the railroad. By experimenting it was found that a certain percentage of moisture kept the material from setting up and sticking to the cars. The hydrator was developed as a means of adding the necessary 2 to 5 percent moisture; the moisture content is determined by the length of haul to the consumer. The apparatus is merely an inclined trommel with counter-rifled spirals that churn and expose the material to the fine streams of high pressure water sprayed through a pipe running the length of the hydrator.

The army and civil consumers require a 9.5 to 12 percent bituminous content. Sizing specifications are: 25 percent minus 10-mesh; 25 percent minus ¼ in. and the balance minus ½ in. A 2 to 5 percent moisture at the mill is allowable. The present cost of the rock asphalt is f.o.b. $7.50 per ton.

Distinguished Service

THE ARMY ORDNANCE DEPARTMENT recently presented Distinguished Service Awards to the American Standards Association and the American Society for Testing Materials "In recognition of outstanding and meritorious engineering advisory services in war and peace, for the development, manufacture, and maintenance of ordnance materiel." Gen. Stewart E. Reimel, recently returned from active service in the Pacific war theater, made the presentation before an assemblage of A.S.A. members, and Maj. Gen. G. M. Barnes, Chief of Research and Development Service, made the presentation of the A.S.T.M. award.

The MULTICLONE Requires Less Space ...Yet Recovers More Dust!

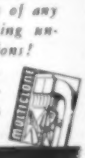

Space-Saving Features
1. Dirty gas enters tube from top, enabling single inlet header to serve an entire bank of tubes.
2. Vane distributes gas uniformly in tube, whirling it into multiple small cyclones. Eliminates complicated manifolding of side-entry collectors.
3. Small tubes mean higher centrifugal forces to clean gas more completely . . . and cleaned gas discharges into single outlet header.
4. Recovered material discharges from tube as quickly as separated, insuring uniformly low draft loss at all times.
GAS IN
GAS OUT
DUST DISCHARGE
SPACE REQUIREMENTS OF COMPARABLE RECOVERY UNITS
Make
Relative Space Requirements
In Sq. Ft.
In Cu. Ft.
MULTICLONE 1.0 1.0
Collector A 2.1 1.8
Collector B 5.9 3.2
Collector C 6.6 3.9

WHEN selecting equipment for the recovery of dusts, fly ash and other suspensions from gases, be sure to check space requirements. Equipment that is compact not only saves valuable plant space and is easier to maintain, but it also minimizes costly duct work, reduces insulation costs and makes other important savings.

In the chart above, the space requirements of the MULTICLONE Mechanical Collector are compared with those of other leading makes of recovery equipment. All figures are based on the same comparable sizes and capacities. Note how the MULTICLONE in some cases saves as much as *six* times the floor space and almost *four* times the room space of other comparable units. Translate these savings into valuable building area and space availability in *your* plant and you have an important reason for selecting the MULTICLONE.

THEN REMEMBER THIS. In the MULTICLONE you do *not* sacrifice recovery efficiency to get compactness. *The MULTICLONE will equal—or exceed—the efficiency of any other collector working under the same conditions!*

Get the full story on MULTICLONE advantages. Send for this booklet . . .



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Mineral Wool Standard

BUREAU OF STANDARDS has issued "Commercial Standard CS117-44, Mineral Wool: Blankets, Blocks, Insulating Cement, and Pipe Insulation for Heated Industrial Equipment," in printed form.

This standard establishes minimum specifications for insulating heated surfaces with mineral wool products for the guidance of manufacturers, distributors, installers, contractors, engineers, and users so as to avoid delays and misunderstandings when making installations and to provide a standard basis for certifying quality of material and installation. It provides minimum requirements for mineral wool blankets, blocks, insulating cement, and pipe insulation for use on heated industrial equipment. It covers requirements for material, thermal conductivity, density, standard sizes, and tolerances. The standard also lists the recommended minimum insulation thickness required for various operating temperatures and recommended methods of installation. The range of types, conductivities, classes, temperature limits, and sizes of mineral wool products for insulating heated industrial equipment are shown in a table. Other tables give pertinent information on insulation of each class and numerous drawings show the approved methods of application.

Copies of CS117-44 are obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 10 cents each.

More Airport Construction

WHILE the big construction jobs on Army and Navy airfields have been completed, there are a number of projects for extensions and improvements. Typical of these is the recently announced work on Mather Field near Sacramento, Calif. Improvements comprise reinforcing and extending runways; reinforcing existing taxiways and construction of new taxiways; reinforcing existing aprons, etc. The expenditure is about $2,000,000. Another big California job of this kind is the authorization for additional construction at Hamilton Field, California. Here the construction consists of a hanger, service aprons, additional buildings, wash rack, loading mat, and minimum essential utilities. The cost will be about $1,000,000.

Now Using Trucks

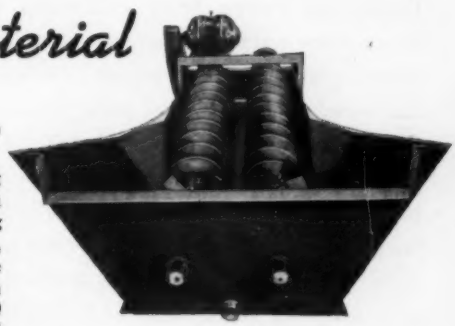
BRYAN-MONROE CO., INC., Raleigh, N. C., has changed over from rail to truck haulage of sand and gravel material to plant. This company is using Euclid haulage units of 15-cu. yd. capacity.

Eagle Washers Clean Gravel of Worst Clay Ball Condition Anywhere!

A Kansas user, after making an extensive survey of available equipment for removing clay balls from gravel pumped from the Kaw River near Topeka, Kansas, reports: "These clay balls carry practically the same specific gravity as the gravel itself, so it proved impractical to install equipment which used an ordinary means of separating the clay balls from the material by flotation. . . . I do not know of a deposit anywhere that has a worse clay ball condition than ours (when we are pumping in virgin material). *Your washer gets the job done and our clay ball worries have been over since the installation of your equipment.*"

EAGLE IRON WORKS
137 Holcomb Ave., Des Moines, Iowa

For Fine Material Washing . . .



Modern-day specifications calling for high percentages of 100 mesh sand make fine material washing doubly profitable. For this work, Eagle offers single and double screw Fine Material Washers in nine sizes and capacities from 30 to 180 tons per hour with flared tubs and other design features to meet both operating conditions and capacity requirements. Eagle engineers are available for suggestions on how to lower your washing costs and increase your premium sand production.

EAGLE *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS
CLASSIFIERS — REVOLVING SCREENS

EAGLE IRON WORKS
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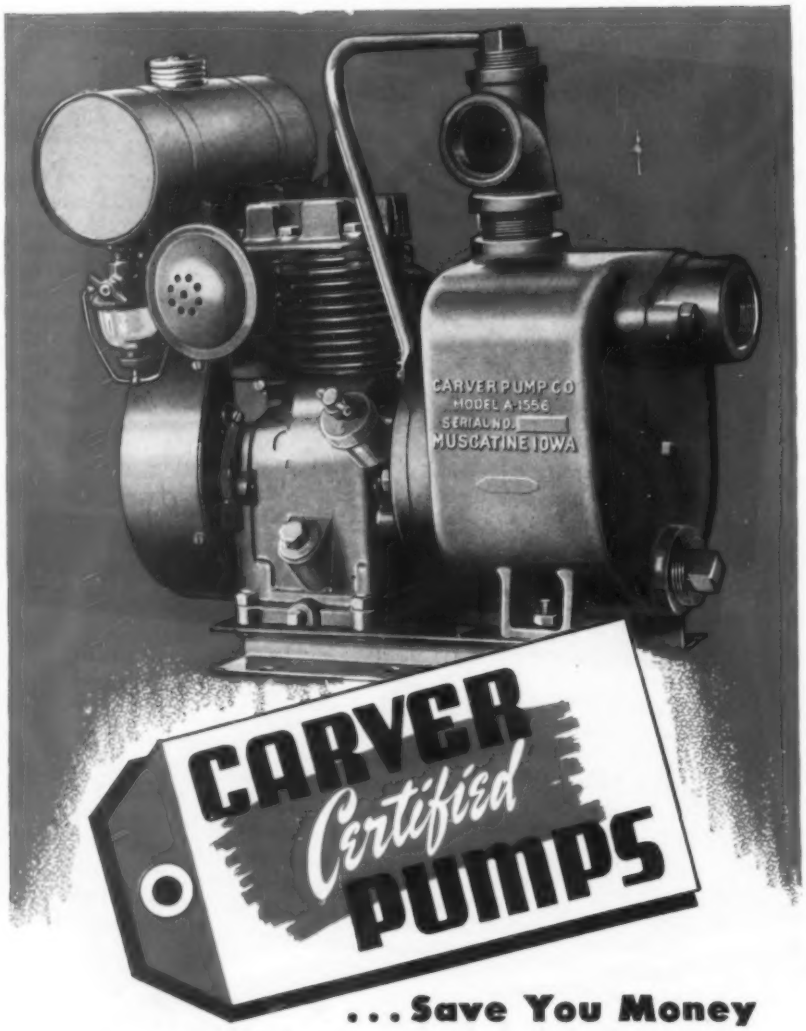
"SERVING INDUSTRY FOR OVER SEVENTY YEARS"



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Every Carver Pump carries a "Certified" tag which means that it has been carefully tested and fully meets our high standards for performance on the job. It's your assurance of peak performance on your toughest jobs as well as on the easy ones. For details, see your nearby Carver distributor or write direct.

THE CARVER PUMP CO.
Muscatine, Iowa

Testing Rock by Dye Penetration

FROST RESISTANCE of stone for construction purposes is now being tested by the Hirschwald nigrosin dye method, according to a recent issue of *Highway Research Abstracts*. The stone is dried to constant weight at 110 deg. C., cooled in a desiccator, and immersed for 24 hours in a 4 percent solution of nigrosin in methyl alcohol. The absorbed dye renders visible cracks that are not detected even with a lens. Frost resistance is determined by the depth of penetration of the dye, a penetration of 0.5 mm. being taken as representing 100 percent resistance. In all but one of a series of tests on aggregates there was agreement between the results obtained by the nigrosin method and those of freezing-and-thawing tests. The nigrosin method has shown that many natural stones are less frost resistant than has been supposed.

The method has also been applied to concrete; the depth of penetration was less in well-graded concrete of high density, and greatest where the density was lowest and the concrete was known to have been poorly compacted. It is suggested that the method may also be applicable to light-weight concrete, artificial stone, brick, etc. An apparent anomaly in certain frost resistant but highly porous aggregates is explained by the fact that, although nigrosin readily penetrates these materials, since the volume of the pores exceeds the amount by which the absorbed water is likely to expand on freezing, stone of this type is not appreciably damaged by frost. The nigrosin method provides conclusive information on the durability of stone more simply and economically than other methods of test for frost resistance.

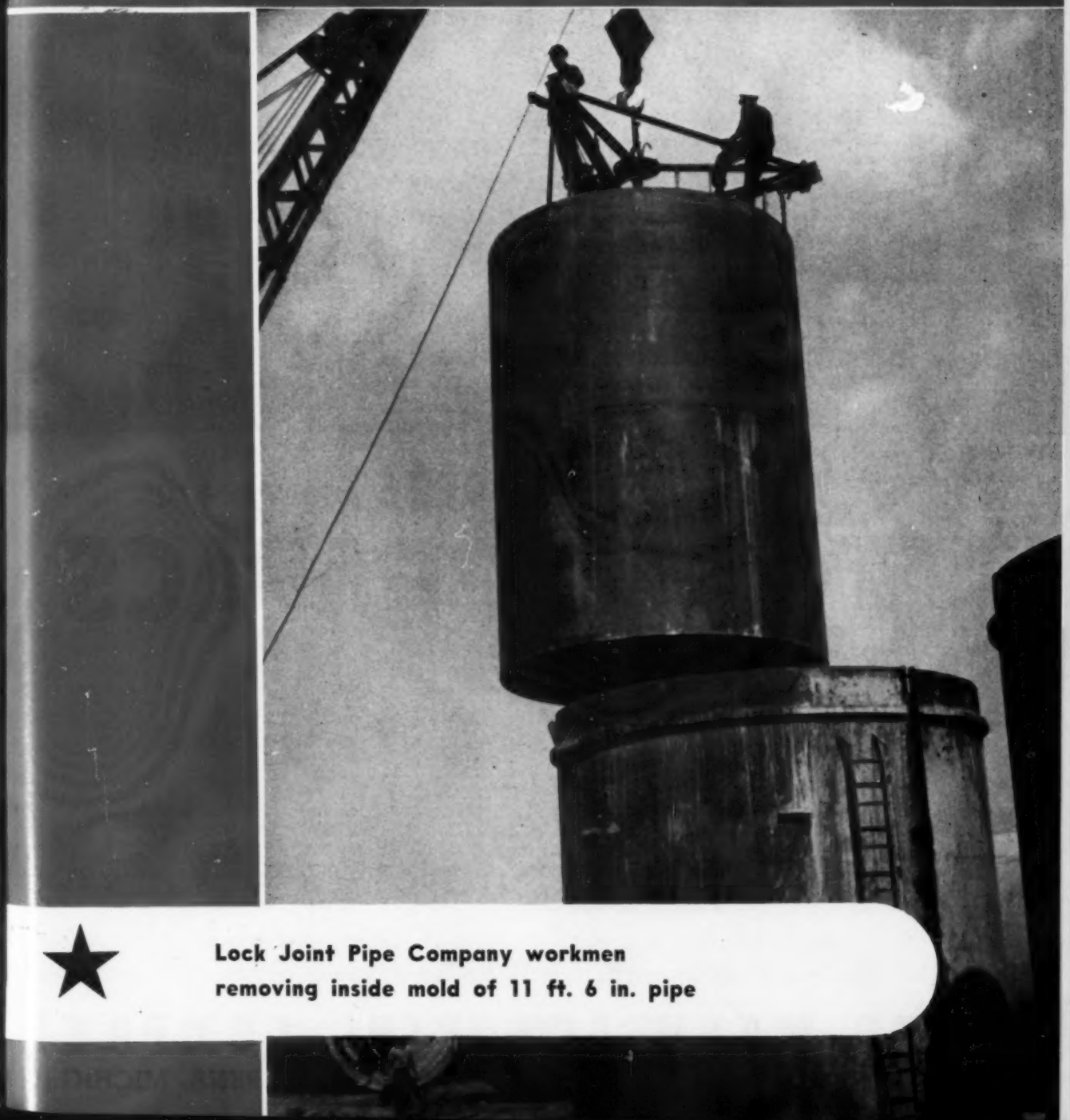
"Plastite" to Permanente

PERMANENTE CEMENT CO., Oakland, Calif., has acquired manufacturing rights for "Plastite" exterior plaster (stucco). "Plastite" is an asbestos cement with certain admixtures which make it adhere to gypsum lath and give it water-repelling characteristics as well as plasticity and early strength. As manufactured by the Permanente Cement Company, asbestos is ground into the cement from the clinker stage throughout the milling process. It was developed by a former general contractor, R. H. Grant and J. H. Datwyler of the California Stucco Products Company of San Francisco, and was marketed by that organization for about two years prior to purchase of manufacturing rights by Mr. Kaiser. Mr. Grant is now with Permanente Cement Company, and will continue his development work in cooperation with Earl S. Reynolds, public relations director for Permanente. Some large construction projects have used the new material.

OCTOBER 1944

ROCK PRODUCTS'

CONCRETE PRODUCTS AND CEMENT PRODUCTS



Lock Joint Pipe Company workmen removing inside mold of 11 ft. 6 in. pipe

CONCRETE MASONRY UNITS
in the
HANDS *of* SKILLED ARCHITECTS *and* BUILDERS
HAVE BECOME IN EFFECT *a New* BUILDING MATERIAL

2 A FEW *of the* LEADERS *who operate* OR MORE VIBRAPACS

(left) JOHN STRANDBERG, Concrete Building Units Co., Kansas City, Mo. . . . Past President, N. C. M. A.

(right) C. E. SWANSON, Manager, Concrete Building Units Co.

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Barnes & Cone, Inc., Syracuse, N. Y.
W. W. Bell Co., New York, N. Y.
Bethayres Concrete Products Co., Bethayres (Suburb of Philadelphia, Pa.)
Birmingham Slag Co., Birmingham, Ala.
Burns Lumber & Fuel Co., Detroit, Mich.
Chicago Insulcrete Co., Franklin Park, Ill.
Cities Fuel & Supply Co., Milwaukee, Wis.
Ellis Concrete Products, Bridgeport, Pa.
Graystone Concrete Products Co., Seattle, Wash.
Layrite Concrete Products Co., Spokane, Wash.
Maule Industries, Miami, Fla.
McCleery-Weston, Vancouver, B. C.
Mercier Brick Co., Detroit, Mich.
V. Paturzo, Bro. & Son, Inc., Baltimore, Md.
Precast Concrete Products Co., Chicago, Ill.
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Complete Equipment for Concrete Products Plants

"Concrete-Steel" Pressure Pipe for Water Supply

By M. W. LOVING*

In Rock Products, September, 1944, we presented an informative discussion of M. Freyssinet's method of making prestressed reinforced concrete pressure pipe. He called it "concrete-steel" pipe in one place in the prospectus, from which the article was prepared, and that seems to be the best term for it. The same applies to the pipe described hereinafter. After discussing his method of fabricating concrete-steel pipe, which is a mechanical scheme for placing the concrete under very high pressure, vibrating, high pressure steam curing, in a series of operations requiring 3.5 hours, M. Freyssinet said: "Another solution consists of developing tension in tie-rods taking bearing upon concrete already sufficiently hardened."

*Consulting engineer.

J. E. Miller, president, Lewistown Pipe Co., Chicago, Ill., has developed practicable methods of producing "concrete-steel" pipe of exceptionally fine quality in his plant at Hillside, Ill., about 20 miles southwest of Chicago. The first installation made with it was 13,100 ft. of sewage force mains for Hammond and East Chicago, Ind., in 1938. The pipe was made in diameters of 24, 30, 36 and 42-in. and in 12-ft. lengths, and the lines operate under a working pressure of 30 p.s.i. (static head of 69 ft.). Hydrostatic tests of the finished lines resulted in a leakage of only 8 gal. per in. of diameter per mile in 24 hours—hereafter referred to as "inch-gallons." The usual allowance for pipe lines built of cast iron, steel and other classes of pressure pipe ranges from 100 to 200 inch-gallons. More than 33,000 ft. of 24-, 30- and 36-in. pipe were required in Chicago and vicinity for supplying water for two very large defense plants and also for city extensions in 1942 and 1943. Hydrostatic tests made on finished lines showed a leakage ranging from 7 to 22-inch-gallons. In 1943, 2,200 ft. were installed for the Standard Oil Company of Indiana at Wood River, Ill., and the leakage on the finished lines was practically nil.

Research on concrete-steel pipe, sponsored by the Lewistown Pipe Co., was carried on at Purdue University, Lafayette, Ind., for more than 10 years under the direction of Prof. Ray B. Crepps. A paper entitled

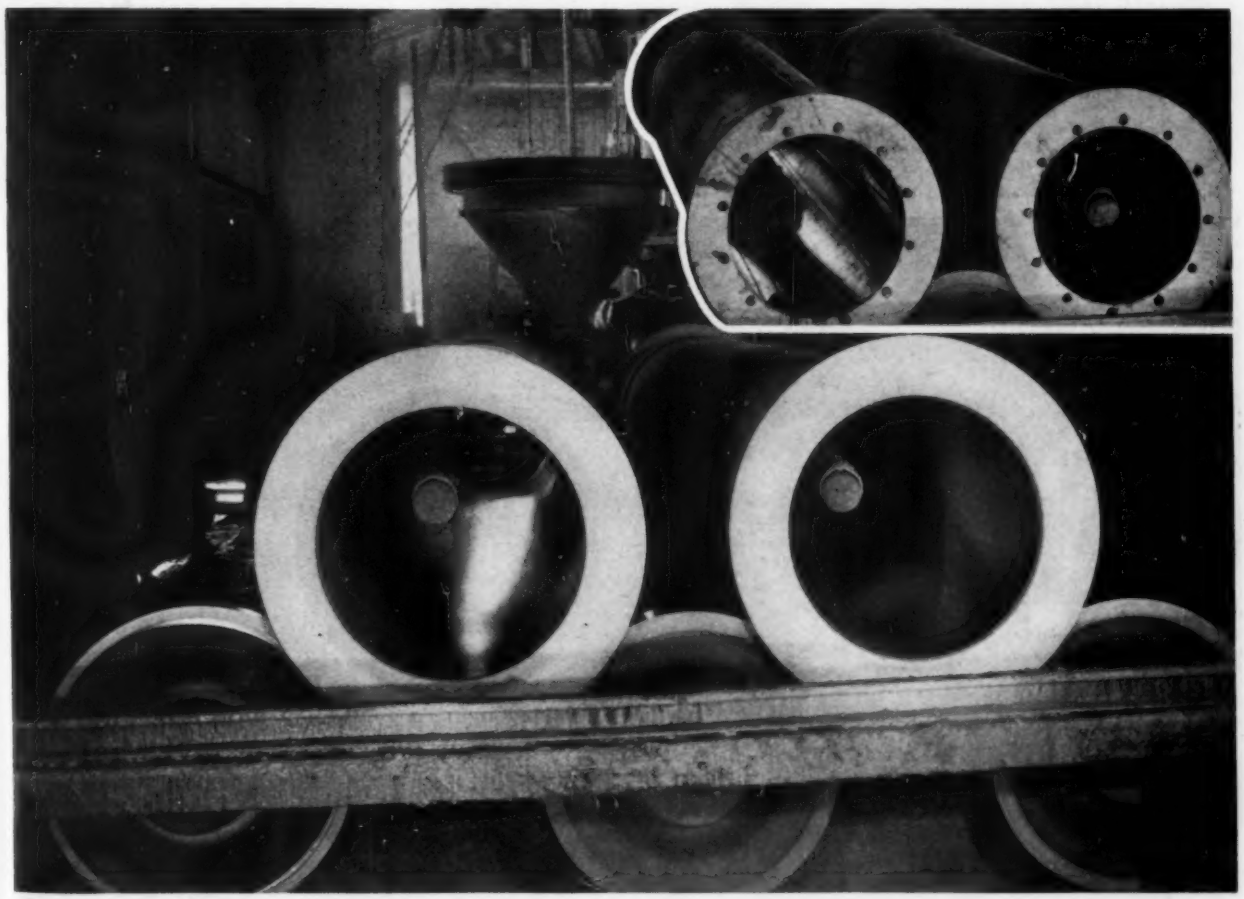

Fig. 1: Spinning concrete-steel pipe; pumpcrete machine in background. Note method of placing longitudinal steel rods (inset upper right) and pumpcrete nozzles for distributing concrete, in the center of each pipe

Fig. 3: A 24-in. concrete-steel pipe wound with No. 6 oil tempered spring steel wire. Close-ups of wire anchor, at right, and sleeve nut, at left

"Wire-Wound Prestressed Pressure Pipe" was presented by Prof. Crepps at the annual convention of the American Concrete Institute[1] in March, 1943. W. W. DeBerard, city engineer, and W. B. Weldon, assistant engineer, Department of Public Works, Chicago, Ill., presented a paper entitled "The Experiences with Wire-Bound Prestressed Concrete Pipe in Chicago" at the annual convention of the American Water Works Association,[2] Cleveland, Ohio, June, 1943. Those interested in the research, technical background and practical experience in installing concrete-steel pipe lines are urged to read the papers just mentioned.

[1] Journal, American Concrete Institute, Vol. 14, No. 6, June, 1943.

[2] Journal, American Water Works Assn., Vol. 35, No. 10, October, 1943.

Manufacturing Methods

In the manufacture of the pipe, the following steps are taken:

(1) The Hume centrifugal process is employed to make the pipe in 12-ft. lengths. The initial shell thickness for 24- and 30-in. pipe is 2.5 in. and 3 in. for 36- and 42-in. diameters. The shell thickness is controlled by end rings which also serve as anchors for the 5/16-in. longitudinal steel bars. The form assembly for 24-in. pipe is shown in the inset of Fig. 1. The 12 longitudinal steel rods are threaded at each end and extend through the end rings. By screwing nuts on these rods, at each end, against the end rings with stress wrenches, the rods are prestressed to 75,000 p.s.i when high carbon steel is employed and 20,000 p.s.i. when ordinary billet steel rods are used.

(2) The concrete mixture is made with standard portland cement and carefully graded fine and coarse aggregates which are thoroughly mixed for more than 3 minutes with about 4.5 gal. of water per sack (94 lb.) of cement. A Pumpcrete machine is now used to place the concrete in the molds in uniform layers throughout the full length of the pipe. This machine, which operates on a track, as a charger is shown in the background of Fig. 1 and the nozzles for distributing the concrete are shown in the center of each pipe in the foreground. The comparatively dry mix employed in the manufacture of concrete-steel pipe minimizes the separation of coarse aggregate by centrifugal force, and a minimum of water and slurry has to be removed, all of which means that the finished concrete has very high strength and the

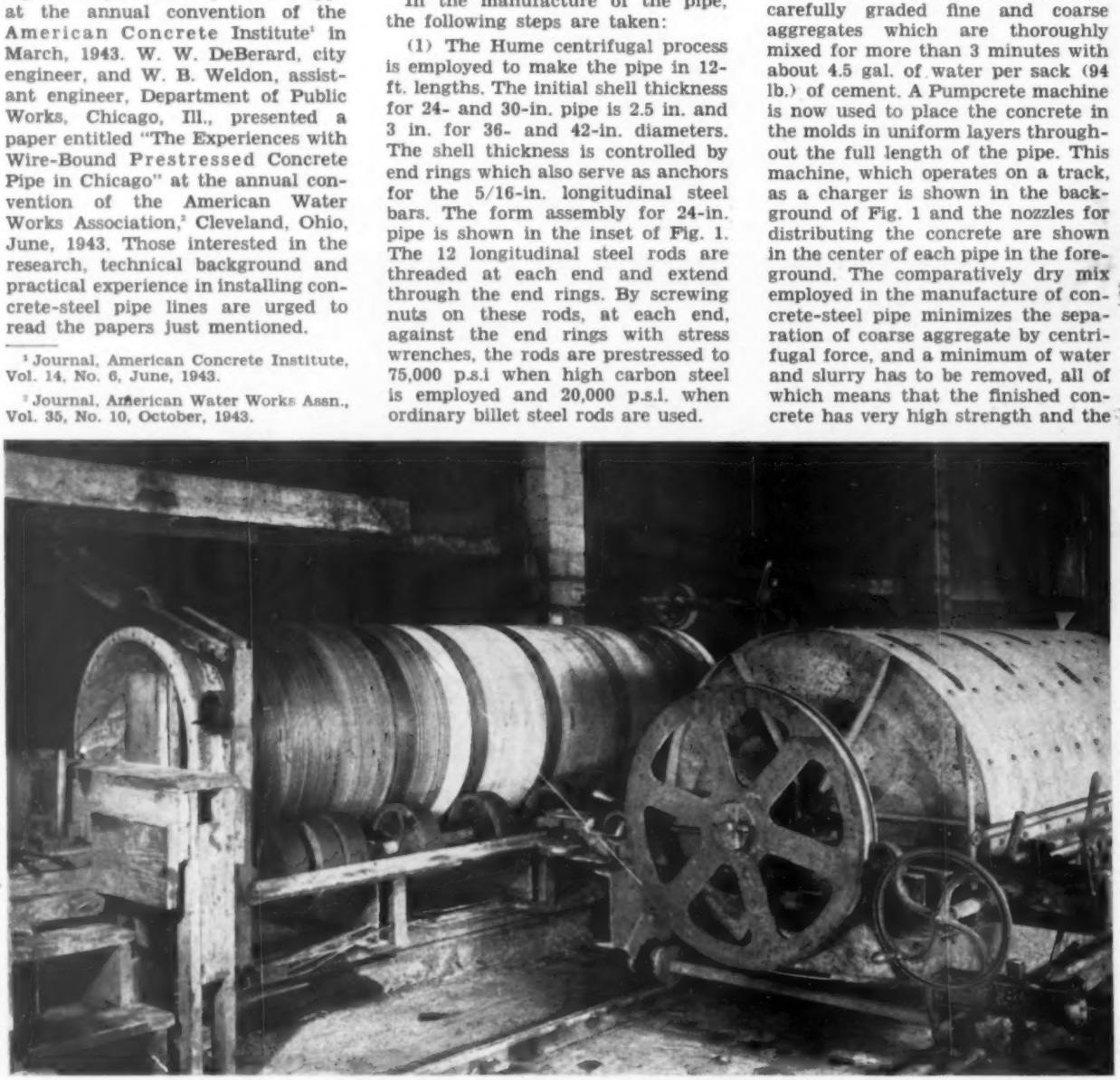

Fig. 2: View of pipe in winding machine (left) and the retarding machine is shown at the right

pipe a very smooth internal surface. Specimens of concrete sawed from aged pipe by Prof. Crepps and tested for compression at Purdue University indicate a strength ranging from 12,000 to 15,000 p.s.i. Mr. Miller says the strength of the concrete at 3 days is around 7,000 p.s.i.

In placing the concrete by the method above described the form is rotated slowly, so as to obtain an even distribution of concrete throughout its length. After the required amount of concrete is placed—governed by the end rings—the peripheral (rim) speed is increased to about 3,500 ft. per min. This densifies the concrete mixture and requires about 15 minutes. The form is then stopped and the slurry is removed; then spinning is resumed and the interior surface is screeded to a perfect finish.

(3) Curing. The pipe, still in the mold assembly, is placed in the curing room and steam cured for 24 hrs. when the form assembly is removed and the pipe cured at about 100 deg. to 130 deg. F. for 24 hrs.—a total of 48 hrs. The pipe is now ready for the winding operation.

(4) The winding machine, developed by Mr. Miller, is shown in Fig. 2. It will be seen (at the left) that the pipe rests on one of two lines of rubber covered wheels supported by power driven shafts. Because of the high tension under which the wire is wound and for safety, the pipe are held down at each end by rubber covered wheels securely braced. The end of the wire is quickly fastened in a specially designed malleable iron

Fig. 6: Installing a 36-in. concrete-steel pipe line in the City of Chicago in 1943

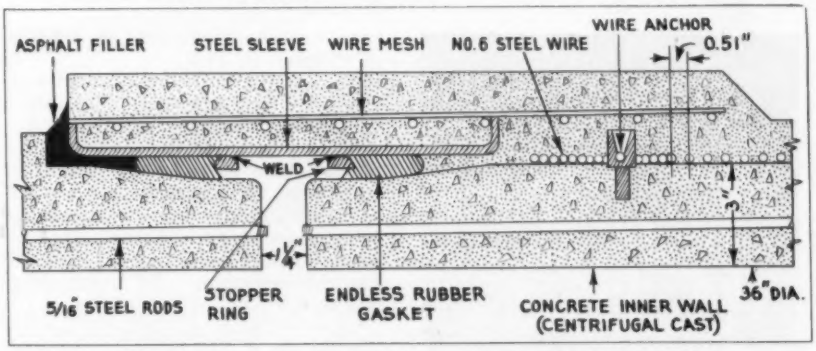

Fig. 4: Joint assembly of concrete-steel pressure pipe for water supply

casting that was embedded in the shell of the pipe near each end for that purpose. (See Fig. 3.) In rotating the pipe, the wire is spirally

Fig. 5: Close-up of ends of 42- and 24-in. concrete-steel pressure pipe

wound with a pitch to provide the required steel area per foot and under a tensile stress of 90,000 p.s.i. The steel wire is fastened at the other end in an embedded malleable iron casting and then cut.

The oil tempered spring steel wire used for this purpose is delivered in rolls of about 3,000 ft. and in one size, No. 6 gage. It cannot be welded and has to be spliced by *sleeve nuts* also made of very high tensile steel. The ends of the wire to be spliced are quickly threaded by special dies, which means that the splice can occur at any point on the surface of the pipe during the winding operation. (See Fig. 3.) Similar wire and the same method of splicing are used to fabricate cables for suspension bridges. The wire has an ultimate stress of 205,000 to 225,000 p.s.i with a yield point of 80 percent of ultimate, or 164,000 to 180,000 p.s.i

In the concrete-steel pipe manufactured by the Lewistown Pipe Co., the steel is designed to operate under working stresses ranging from 90,000 to 100,000 p.s.i.

(5) The retarding machine shown at the right (Fig. 2) is a steel drum, containing sand. By adjusting the quantity of sand in this drum, the required *drag* can be controlled and it remains constant for the wire wound on any diameter of pipe. For a No. 6 wire, which has a diameter of .1920 in. and a sectional area of .028953 sq. in., when wound at 90,000 p.s.i., the drag for a 36-in. pipe is 2700 lb. The two wheels shown in the foreground, governed by controls, wind the wire on the pipe spirally from end to end with a uniform pitch or spacing. Because the retarding machine travels on a track parallel to the pipe being wound, the controls are so carefully adjusted that winding may be stopped at any time, especially when the ends of the old and a new coil of wire have to be spliced.

To determine the tensile stress of the wire at any time during winding operations, a Huggenberger strain gage may be employed. This gage measures the stretch of the wire in a length of 1 in. The same end results may be accurately obtained by marking a circumferential wire at any point with a pencil and at a point on another wire on the same plane that would represent a length of 20 ft. or 240 in. Then release the tension on the drum and measure the stretch of the wire in 240 in. Under 90,000 p.s.i. tension, the elongation of a No. 6 wire is .003 in. per 1 in. of length and for 240 in. it is .72 in. The elongation per inch is arrived at by dividing the steel stress (90,000 p.s.i.) by the modulus of elasticity of the steel—30,000,000 p.s.i.

When wound on the pipe under this high tension, the steel wire, when the tension is released by reversing the machine, does not uncoil as one would expect but it remains in close proximity to the periphery of the pipe. Even if this did happen, the percentage of error would be on the safe side in using this method of checking the tensile stress under which the wire is being wound.

(6) The joint assembly is shown in Fig. 4, and consists of a steel collar similar to the rim of an automobile wheel. In fact, it is made by a firm engaged in that line of business. The two metal stop rings, welded to the steel sleeve mechanically seat the endless rubber gaskets. From this drawing it will be seen

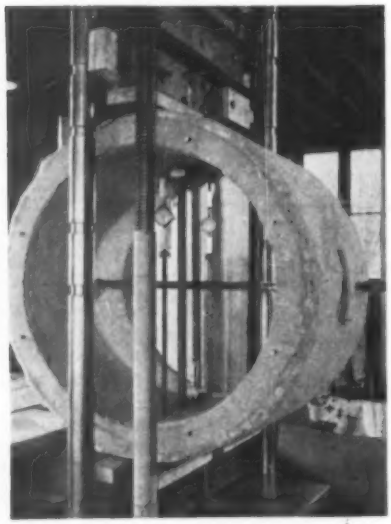

Fig. 7: Testing 2-ft. length of 30-in. concrete-steel pipe at Purdue University

that the joint assembly is encased in concrete 1 in. in thickness, and at the right a cross-section of the anchor castings. The shape of the ends of each pipe is also shown in this drawing, which is not wrapped with high tensile steel wire within 6 in. of the ends of the pipe because the internal hydrostatic pressure of the pipe line at and in the vicinity of the joint is sustained by the steel sleeve of the joint assembly, supplemented by the circumferential steel placed in the collar.

Each pipe just after the winding operation is subject to internal hydrostatic pressure double the head under which the line is designed to operate.

(7) Concrete encasement of the pipe and joint assembly are accomplished by placing the pipe on end in steel forms so that a 1-in. coating of concrete is placed. This coating is steam cured for 12 hours while in the steel forms and for 36 hours or more after the forms are removed, in large, portable curing boxes.

Mr. Miller has developed a method of placing this coating by a modified gunite scheme which may properly be termed guncrete. This expedites production operations and eliminates the necessity and expense of using the steel forms for that purpose. This coating may be finished in a workmanlike manner by troweling the guncrete coating while the pipe assembly is slowly rotating. Fig. 5 is a view of 42- and 24-in. concrete-steel pipe in storage. When the pipe are delivered to the trench for laying, it is only necessary to place another endless rubber gasket in the joint assembly shown in Fig. 4 and the pipe is shoved home by means of a pull jack shown in Fig. 6. This is a view of the installation of a 36-in. "concrete-steel" pipe line in the City of Chicago in 1943.

For making branch connections on concrete-steel pipe lines, split sleeve connections are installed. The annular space between the inner surface of the sleeve and the pipe is calked with lead. The same method is used to tap cast iron pipe lines under pressure. A Mueller tapping machine with special cutting edges is used to tap concrete-steel pipe lines under pressure.

Test Results

Resistance to external loading is a major feature of "concrete-steel" pipe. On September 1, 1939, a test was made at the plant of the Massey Concrete Products Co., Chicago, on their 300,000-lb. capacity Tinius Olsen testing machine. A 24-in. "concrete-steel" pipe 12 ft. long was tested by the three-edge method. After considerable difficulty in arranging steel I-beam assemblies for transmitting the load to the top of the pipe, the results were as follows: 20,100 lb. per lin. ft. when a small crack occurred at the bell end. The ultimate load was beyond 300,000 lb. or more than 25,000 lb. per lin. ft. When removed from the machine, no cracks were visible in the pipe.

Other tests have been made on larger diameter pipe and Prof. Crepps made the following statement before the American Concrete Institute in 1943:

"The merits of the wire-wound pipe under external loading are illustrated in a three-edge loading test made in the Materials Testing Laboratory at Purdue University. A 30-in. diameter pipe, 2 ft.-0 in. long with a 2.57-in. structural shell was wrapped with wire under a tension of 83,000 p.s.i The steel area was 0.030 sq. in. per in. length of pipe. The arrangement for securing deformations in the concrete and steel are noted in Fig. 7 and the plotted results are shown in Fig. 8. The 0.01-in. crack occurred at a load of 16,500 lb. and the ultimate at 28,500 lb. per ft. length of pipe. In comparison with A.S.T.M. specifications for Reinforced Concrete Culvert Pipe (C76-41) the wire-wound pipe had a smaller wall thickness and the quantity of circumferential steel equal to about 5/6 that of elliptical reinforcement, but it gave loads greater than three times the requirements.

"The wire-wound prestressed concrete pressure pipe has advantages of economy of steel and quality of concrete to satisfy engineering designs for high pressure heads. The magnitude of the internal pressure, resulting from hydrostatic heads or external loadings, to be resisted by the pipe will govern the design for quantity of steel wire and its prestress used in wrapping. The designed structure also possesses resistance to external loading exceeding any present requirements for bonded steel reinforced pipe."

Advantages of "Concrete-Steel" Pipe

After reading this article and the one describing M. Freyssinet's process in the September issue of ROCK PRODUCTS, the reader is likely to ask this question: Why go to all the trouble and expense to manufacture and install "concrete-steel" pipe, especially when it is said that cast iron pipe has a life expectancy of

(Continued on page 120)

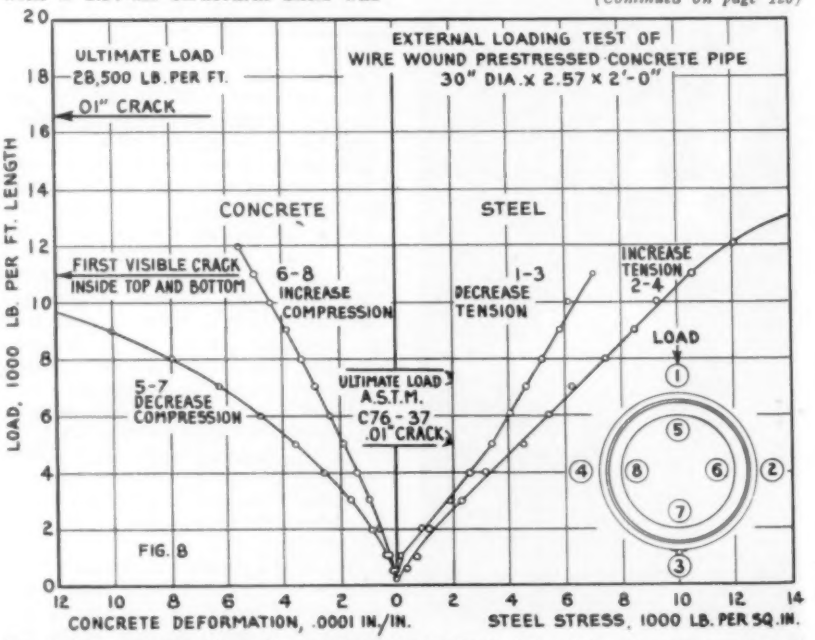

Fig. 8: Diagram showing the results of a three-edge loading test of a 30-in. wire-wound prestressed concrete pressure pipe

Ask Yourself

Question: How can I speed up curing to conform with present high speed production rates on block and brick machines?

Question: How can I reduce stock pile investments, speed up deliveries, and service larger jobs within a shorter time?

Question: How can I insure delivery of dry, fully cured, shrink-proof concrete?

Question: How can I obtain high early strengths with less cement, obtain block free from spalling, crazing, checking, leaching and efflorescence; free from volume changes, expansion or contraction when laid dry in wall?

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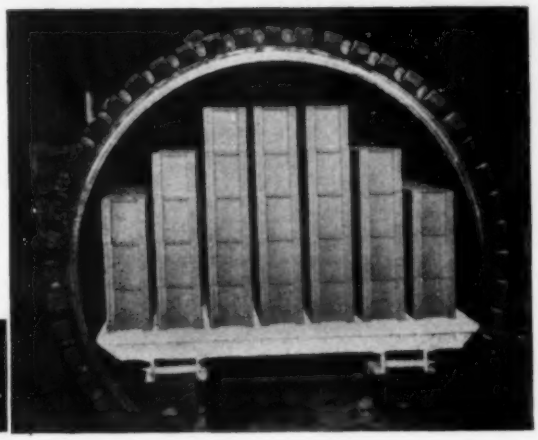

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Lift truck moving loaded rack of block from curing room to storage yard

Block for Federal Housing

By HERBERT E. SWANSON

Concrete Building Units Co., Kansas City, Mo., adds two block machines and enlarges curing capacity to meet heavy demand from F.H.A. projects

DUE TO A HOUSING PROJECT boom in the Kansas City area during recent years, the Concrete Building Units Co., of Kansas City, Mo., found it necessary to add new equipment to increase production of concrete masonry units. Unable to meet the increased demand for block with its normal rate of production, new block machines and new lift trucks were added. The mixer and curing room capacity were also enlarged. The result was an up-to-the-minute concrete products plant with quadrupled capacity.

This company provides concrete units for all types of construction. Twenty F.H.A. housing projects, including the Fairfax Hills Project of 286 units, as well as numerous industrial and war plants in this area are being served at the present time.

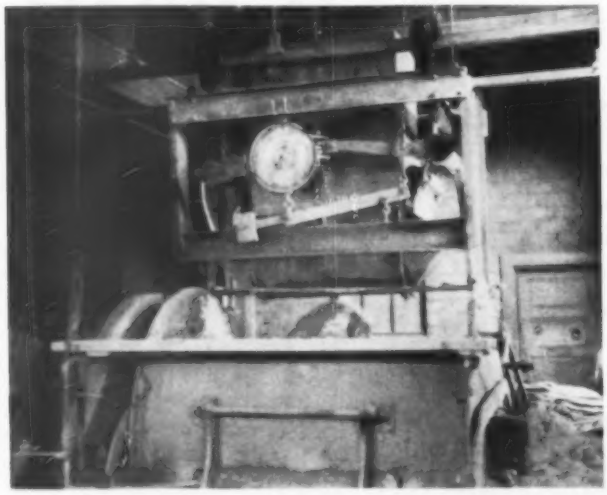
Although joists, lintels, and other special products are still manufactured, 90 percent of the production is concentrated in concrete block. The capacity of the plant is now about 1200 standard 8- x 8- x 16-in. or equivalent block per hour. Two new Besser Vibrapac block machines, one purchased in 1941 and the other in 1944, and two new Erickson platform lift trucks plus the enlargement of curing room and mixer capacity have enabled this company to meet the present day demand.

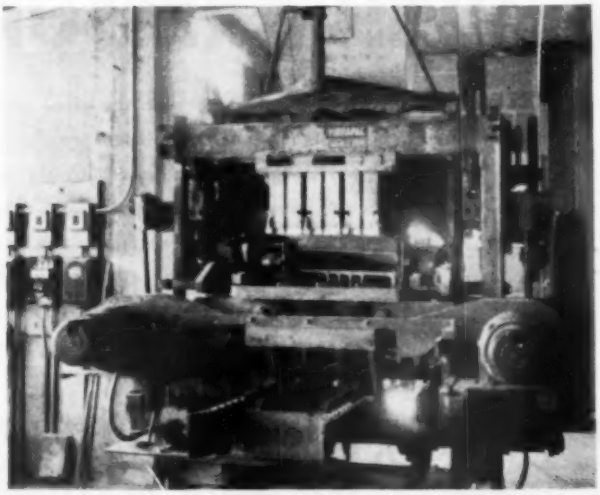
Sand and crushed stone are brought to the plant by both truck and rail, and are deposited into a 10-ton capacity underground hopper, located at one side of the plant. The aggregates are fed by gravity into a continuous, belt driven, bucket elevator, 70-ft. centers, driven by a 10-hp. motor, up to three concrete silo storage bins, located in the roof of the building. These bins each have a capacity of 6340 cu. ft., two being used for sand and one for stone. Draw off spouts under the tanks discharge the aggregates into a 1½-ton capacity weigh batcher, which is equipped with Fairbanks-Morse scales. This weigh batcher travels on a Cleveland tram rail by which the aggregate may be deposited into either of two Besser mixers for block production or into concrete carts for transportation to another Besser mixer with 25 cu. ft. capacity for the manufacture of other types of units.

A continuous chain elevator, 22-ft. centers, with prong attachments, elevates cement in bags from the delivery platform to the second floor, where the mixers are located. Cement is introduced to the mixer manually.

A ¾-in. water pipe, tapped into the city water system, provides water for the mix. A 60-hp. oil well boiler is used to heat water for winter mix-

(Continued on page 118)





Left: Weigh batcher of 1½-ton capacity operating on tram rail over 40-cu. ft. mixer. Right: One of two new, high production block machines

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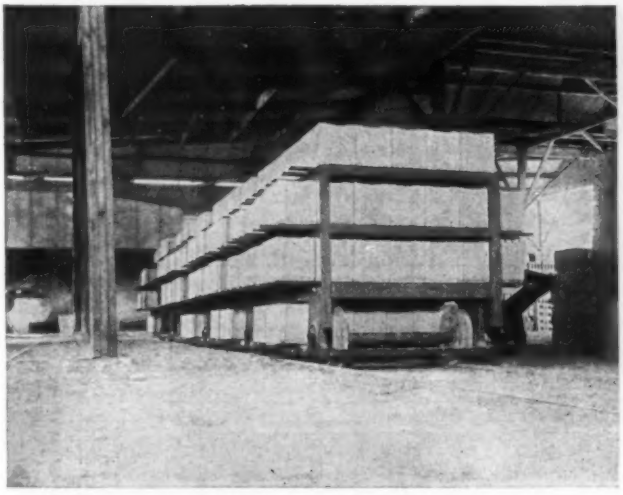

● Style 198 Block Cars for high pressure steam curing at L. G. Randolph Concrete Products Co., Ann Arbor, Michigan.

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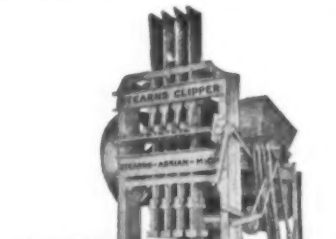

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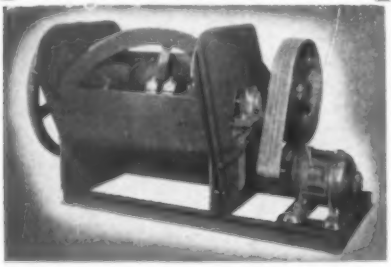

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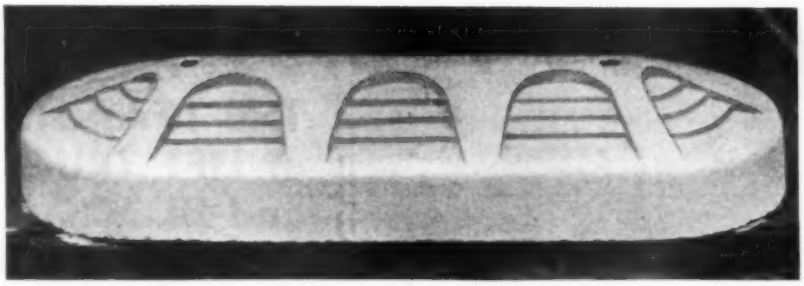


Close-up of precast concrete highway dividers. White portland cement is used

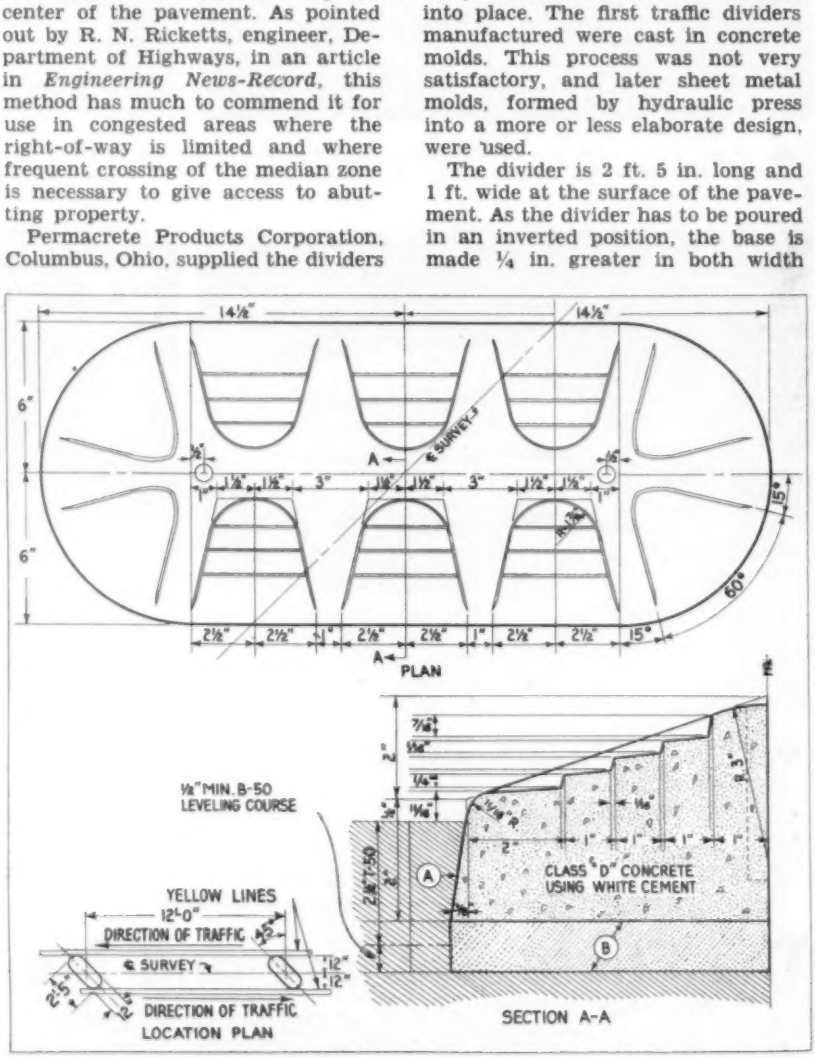
Ohio's Precast Highway Dividers

Permacrete Products Corporation, Columbus, Ohio, manufactures dividers under state inspection

TO SEPARATE opposing lanes of highway traffic, the Ohio Department of Highways has made an installation of precast concrete dividers on two main routes leading into Columbus. The precast dividers are set in recesses cut at intervals along the center of the pavement. As pointed out by R. N. Ricketts, engineer, Department of Highways, in an article in *Engineering News-Record*, this method has much to commend it for use in congested areas where the right-of-way is limited and where frequent crossing of the median zone is necessary to give access to abutting property.

Permacrete Products Corporation, Columbus, Ohio, supplied the dividers for the first project in 1943. Geo. E. Nagel, vice-president of Permacrete, advises that specifications called for special white portland cement, silica or marble aggregate. The manufacture is carried on under State inspection, and the concrete is vibrated into place. The first traffic dividers manufactured were cast in concrete molds. This process was not very satisfactory, and later sheet metal molds, formed by hydraulic press into a more or less elaborate design, were used.

The divider is 2 ft. 5 in. long and 1 ft. wide at the surface of the pavement. As the divider has to be poured in an inverted position, the base is made ¼ in. greater in both width



Showing construction details of precast highway divider, and location plan for highway installation

and length than the top to permit easy removal from the forms. The center of the divider is 2½ in. higher than the surface of the pavement with the ends and sides sloping in a distance of 6 in. to a height of ½ in. above the surface of the pavement on all sides. The depth of the divider below the surface of the pavement is 2 in.

To give maximum visibility at night and during rainy weather, the median divider has been scored with 10 depressed panels having sawtooth faces. This design is said to produce a stereoscopic effect that makes the divider appear to be about 4 in. in height. The precast unit gives better results than cast-in-place units, where scoring is employed, due to the smoother and denser concrete surfaces obtainable. The critical angle of the reflecting faces also may be better controlled by the mold.

Two ¾-in. holes are cast in the dividers for the full depth to facilitate placing in position in the pavement. These holes are later sealed with sand and a ball of asphalt. Dividers are spaced 12 ft., center to center, and are set on an angle of 45 deg. with the center line and sloping with the direction of traffic. To a motorist traveling along the highway, these dividers appear to form a continuous wide white division between the opposing lanes that is slightly raised above the pavement.

Concrete "Legs" for Water Tank

IN THE ACCOMPANYING ILLUSTRATION may be seen how steel members supporting a steel water tank were reinforced with concrete. The four steel legs supporting the tank had become badly rusted away at the base so that replacement would have been necessary. The engineers decided to construct sectional steel forms which were placed around the uprights and poured with concrete. This repair may have been made by pouring concrete into interlocking concrete pipe sections.

Steel water tank supports reinforced with concrete

Modular Planning

NATIONAL CONCRETE MASONRY ASSOCIATION has taken an important part in the work of the American Standards Association Committee responsible for the coordination of building materials on a modular basis. Recently the Portland Cement Association distributed a bulletin of The Producers' Council entitled, "Modular Planning as Related to Building Design." This bulletin gives a comprehensive explanation of the application of modular planning to the design of buildings. The majority of the National Concrete Masonry Association membership has indicated that a ⅜-in. mortar joint allowance will be best suited to the product. Therefore, the standard face net dimension will be 7⅝- x 15⅝-in.; standard net thickness will be 3⅝-in., 7⅝-in., 9⅝-in., and 11⅝-in.

Concrete Products Men Meet in Seattle

MANUFACTURERS of concrete pipe and concrete masonry in the Pacific Northwest held their regional association meeting in Seattle, Wash., September 23. The Concrete Pipe and Products Association has its headquarters in Seattle, Wash. C. M. Howard, engineer of the association, is in charge of engineering and promotional activities of the association.

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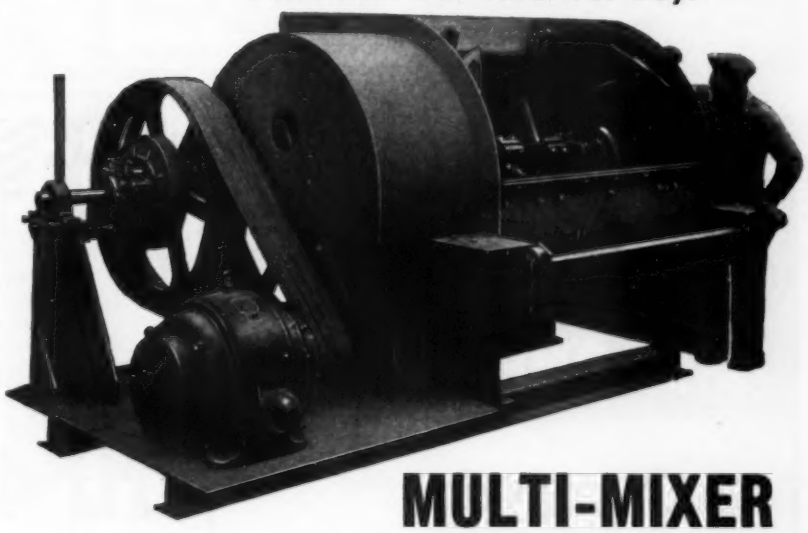
A Better Mix at Lower Cost

Per Batch! Per Yard! Per Day!



MULTI-MIXER

- New type paddles
- Reverse action mixing
- Thorough, low-cost mixing
- Sturdy construction
- Guaranteed to do the job

Highly efficient concrete products plants use Multi-Mixers to get faster and more thorough mixing of every concrete batch. The unique paddle design and reverse screwtype mixing action keep costs of mixing low and quality of concrete high. Another feature of distinction is the side, end, or bottom discharge. This permits much greater convenience in handling. For better service, install a Multi-Mixer.

Write today for booklet describing the complete line of Multiplex Mixing Equipment, Double and Single Hand Press Strippers, and Super Tampers.

THE MULTIPLEX CONCRETE MACHINERY CO.

ELMORE, OHIO

Block for F.A.H. Propects

(Continued from page 114)

ing. This boiler also provides live steam for curing.

Each of the Besser mixers is powered by a 25-hp. motor, and has a capacity of 40 cu. ft. The mixers discharge by gravity to two Besser Vibrapac block machines located on the main floor of the building. The Vibrapacs have a combined capacity of 1200 8- x 8- x 16-in. or equivalent block per hour.

An off-bearer, operated by a Curtiss air hoist, lifts the block from the Vibrapac and deposits them on to the racks. The hoist is supplied with air by a four cylinder, 30-cu. ft. Brunner air compressor, powered by a 5-hp. motor.

The racks, on which the block are placed, are five tiers high and will hold 60 standard block. They are transported to the curing rooms by the Erickson platform lift trucks.

Six curing rooms, having a capacity of 9720 standard block are fitted with steam pipes for steam curing. Pipes enter the rooms near each wall and close to the ceiling, extending into room for a distance of 15 ft. The block are cured for a 24-hour period at a temperature of 125 deg. F., after which they are removed by the lift trucks to the storage yard for further curing. This

To the left, chain elevator to raise cement sacks to mixer floor. To the right, track opening to 10-ton capacity hopper and enclosed bucket elevator to concrete silo storage bins

storage yard has a capacity of 200,000 block.

A 30- x 30-in. tunnel, constructed at right angles to and immediately above the curing rooms and opposite the plant end, has openings into each room. An American blower fan, located at the end of the tunnel draws off the steam in the rooms, after the curing period, through a stack, which prevents the steam from entering the plant when the curing room doors are opened.

To speed the handling and to develop early setting of the concrete, two parts of high early strength cement are used to one part of portland cement in the mix.

John L. Strandberg, a past president of the National Concrete Masonry Association, is the president of the Concrete Building Units Co., which is one of the most progressive concerns manufacturing concrete units in the United States. C. Ernest Swanson, also a prominent figure in the industry, is affiliated with Mr. Strandberg in the operations of the company.

To Make Block

H. G. JOHNSON, who manufactured cinder concrete block at Nyssa, Idaho, prior to the government curtailment of cement purchases two years ago, is now constructing a new building in which to manufacture block this winter. Both volcanic and coal-derived cinders are used as aggregates.

To Build Navy Plant

UNITED CONCRETE PIPE CORPORATION, Los Angeles, Calif., has been awarded a contract by the U. S. Navy for the construction of an ammunition classification and segregation yard in California. The contract was for $1,540,000.

Make 6" to 48"
CONCRETE PIPE
with ONE Machine

Produce Pipe Profitably

Universal's "All-Purpose" Machine produces Concrete Pipe in all sizes from 6" to 48"—and shows you a worth-while profit. With a tamping capacity of 680 strokes per minute, your product is more dense, durable, finished in appearance. We can also outfit you for making larger sizes, up to 135".

Write today for Catalog and Details.

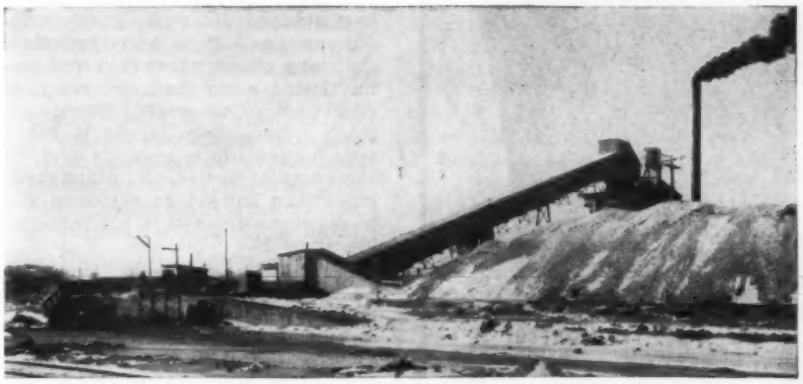
UNIVERSAL
CONCRETE PIPE CO.
Columbus 15, Ohio

PERFORATED METAL
SAND AND GRAVEL SCREENS
Manufactured exactly to your specifications
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices
CHICAGO PERFORATING CO.
2437 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

YOU SPECIFY-WE FURNISH
Better Johnston Steel Racks and Pallets . . . are built on order to suit your needs. They are the most economical and efficient that can be made for your plant requirements. Johnston racks and pallets are already giving complete satisfaction in numerous plants. Let us handle your requirements.

JOHNSTON IRON WORKS
1133 Cornelia Ave.
Chicago 13, Illinois

NEARLY NEW CONCRETE BATCHING PLANT



Capacity 250-350 Cu. Yd. Per Hour . . . Available for Immediate Delivery.

Complete Butler concrete plant. Excellent condition, used only 7 months. Adaptable for either commercial or construction use where high rate of concrete pour may be required. Equipped for manual, semi-automatic or automatic operational control. See details below.

BATCHING BIN. Bin—250 yd. capacity—190 yd. 3-compartment aggregate 400 bbl. cement.

2 BUTLER CEMENT STORAGE BINS. 2,000 bbl. capacity, 2-compartment, 3,000 bbl. capacity, single compartment. All bins equipped with air jets and steam jets.

BATCHERS. 1 Butler aggregate 5 yd. capacity, complete with beam-type scale, manual operation.

1 Butler cement 3,000 lb. capacity, complete with beam-type scale, manual or automatic operation.

1 Butler water batcher 200 gals. capacity, beam-type scale, complete with 400 gal. surge tank and valves, manual or automatic operation.

ELEVATOR & TRACK SCREW. 300 bbl. per hour capacity, screw 37 ft. long, equipped for either box car or hopper car cement delivery. Complete with 20 hp. electric motor.

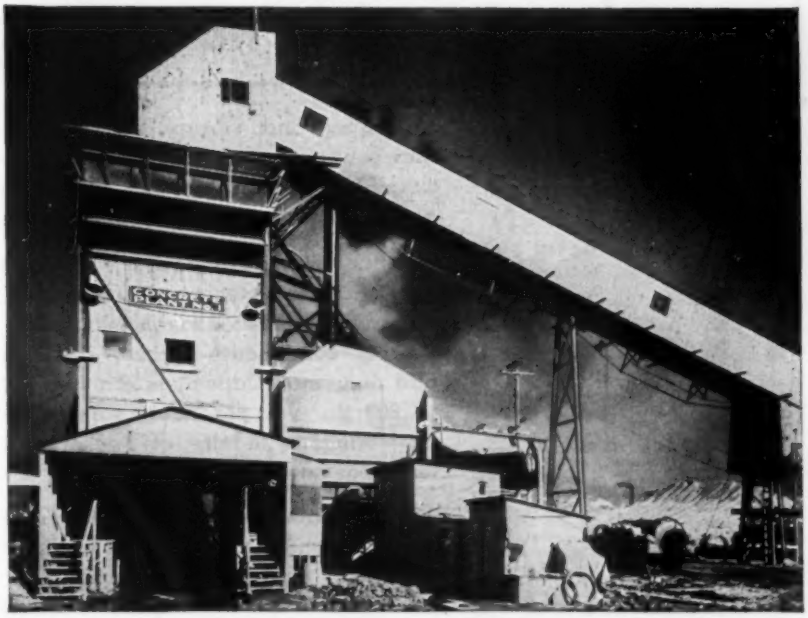
CONVEYORS. 1 Barber Greene 36" inclined conveyor 224' 6" long, equipped with: 50 hp. Century motor; one 40 yd. track hopper; one 20 yd. track hopper; one 20 yd. truck hopper. All necessary A frames, trusses and supports included. All hoppers equipped with discharge gates.

1 Barber Greene 36" horizontal conveyor 129' 6" long. Complete with 18 double clam-type fill valves, 20 hp. Century electric motor complete with trusses.

1 Barber Greene 36" inclined conveyor 60' 6" long. Complete with 15 hp. electric motor, trusses and supporters.

All conveyors in excellent condition; two-way Alemite system of lubrication; band-type brake; pivoted distributor, ground level controlled. Conveyors operated under cover while in use. Idler take-up and return idler rollers in good shape. Extra length new 500 ft. belt available.

MISCELLANEOUS. Collecting hopper under batcher, 5 feet cement screw feeder complete with motor for automatic control of cement. Traveling hopper for charging batch trucks. Extra cement buckets, drive chain, elevator chain for cement elevator and track screw, etc.



Also 28 Late Model Transit Mixers

11—1942 Model Jaegers — High discharge, separate engine drive with two-speed transmission. 7 mounted on 1942 Dodge six wheelers, good rubber, excellent condition.

7—1942 Model Smiths — High discharge type. These mixers were used only 6 months.

Also 6 — 1938 Model Smiths — High discharge type. 3 mounted on 1938 Autocars, 2 on Macks and 1 on White truck. All single axle drive in good condition, with good rubber.

MOTOR TRUCK SALES AND EQUIPMENT COMPANY

Telephone: CALUMET 1255

2435 COTTAGE GROVE AVENUE **CHICAGO, ILLINOIS**

Accurately Grading More Tons Per Hour

On this job, as on hundreds of other installations, Seco vibrating screens true circular gyrating action is always 100% efficient — over *every inch* of screen surface. That's why materials are driven through the meshes more thoroughly and more quickly while Seco's excellent conveying action keeps the load moving. This unit is in its seventh year of smooth, dependable operation. Write for complete information. Dept. B.

SECO SCREEN EQUIPMENT CO., INC.
9 Lafayette Ave. Buffalo 13, N. Y.

Scrapers and Cableways
for Long Haul Work

Above picture shows how a Sauerman Slackline Cableway digs deep under water and lifts gravel to a hopper on top of a screening plant. The operating cost is only a few cents per cubic yard handled and the machine cleans up every yard of material within a 700-ft. radius of the plant. This machine was installed in 1919—has handled several million cubic yards at three locations—is still as good as new.

Digging and stockpiling problems that confront aggregate producers are simplified—costs are reduced—by use of Sauerman Scrapers and Cableways.

A Sauerman machine digs with equal facility under water, on mushy ground, on a hillside or in a rough pit. Operation is continuous—digging, hauling and dumping. Capacities run from 10 to 600 cu. yd. per hour, varying in accordance with size of bucket and length of haul.

Tell us about your excavating and material-handling problems. If we think Sauerman equipment will meet your particular needs, we will offer suggestions and send you our catalog.

SAUERMAN BROS., INC.
530 S. Clinton St., Chicago 7

Concrete Pressure Pipe

(Continued from page 112)

more than 100 years and most of the cities throughout the country use cast iron pipe for water supply without question? It is true that there are many places where cast iron pipe has lasted more than 100 years, as advertised. Conversely, there are many other places where it has a very limited life expectancy and the same applies to steel and other metal pipe when subject to corrosion due to active waters with a pH rating of less than 7.

In this country cast iron and wrought iron pipe have been commercially lined for 100 years with cement mortar to prevent rusting or oxidation of the metal. Charleston, S. C., is one place where all cast iron used for water supply, including distribution mains, must be lined with cement mortar. Many of the largest steel pipe lines in the cities of New York, San Francisco, Los Angeles and elsewhere are lined and often coated with concrete for precisely the same reason. Officials of a large eastern city had a very thorough investigation of this subject made in France in 1925. The reader will be interested in the following statements from that report:

Experience in Europe

"In 1894 the first installation of steel cylinder reinforced concrete pipe was made in Paris under direction of M. Bonna, who was a Director in the Department of Public Works. The experiment was successful and M. Bonna organized a company which does the largest business of its kind in Europe, and had up until 1925 installed some 1600 kilometers (994 miles) of reinforced concrete pipe. The history of these pipes is very satisfactory; there is on record but one case of sudden rupture, when two sections of pipe were blown out by water hammer, probably in the presence of entrained air during the tests of a new installation involving centrifugal pumps.

"Interviewed M. Mayearts Engineering Compagnie, Intercommunale Bruxelloise, largest water company in Belgium. This company has 53 installations of steel concrete pipe made during 1902-22, operating under heads up to 120 meters. No breaks are reported and no leaks. Upkeep is reported high on cast iron, with substantially none on concrete pipe. In 1925 a pipe which had been laid in 1900 was cut open for inspection and the steel found in excellent condition.

"Interview with M. Gaillet, engineer in charge of Pumping Station and Pipe Lines in Paris. Cast iron leaks at joints more than concrete pipe, where there is deterioration of cast iron due to electrolysis. There is continuous maintenance cost on cast

iron pipe and none on concrete.

"Inspection of pipe in Paris. Inspected several sections of Bonna pipe that had been laid 1899-1900 and removed in 1923 for investigation. Pipe smooth on inside, no apparent wear or pitting; steel reinforcement and plate found perfectly blue and in excellent condition.

"Interview with M. F. Hachez, director general, Du Societe Nationale Des Distribution d'Eau, a semi-government corporation, Belgium. Steel concrete considered as good as cast iron, and costs two-thirds as much.

"In England, I found economic conditions were such that reinforced concrete pipe had difficulty in competing with cast iron in price.

"In the north of England the soft waters occasion very serious internal corrosion of steel pipe and tuberculation of cast iron pipe. For combatting this condition, cast iron pipe with centrifugally placed cement lining is largely used."

Charles J. Des Baillets, chief engineer, Montreal Water Board, Montreal, Canada, made the following statement:[4]

"About July, 1929, two lengths of this Bonna pipe, 10 in. in diameter, were purchased and received from France, and tested under the supervision of the Water Board. The results of these tests were so satisfactory that the Water Board was convinced that the Bonna system of pipe construction, with minor improvements in design and fabrication, would make possible a concrete pressure pipe with all the desirable and none of the undesirable characteristics of the cast-iron and steel pipes. Since this date, the use of this type of pressure pipe has become standard practice with the Montreal Water Board. . . .

"Some of the desirable features of this type of water main are the following:

"(1) The first cost of manufacturing and laying is not excessive.

"(2) The concrete pipe has a very smooth inner surface which results in a very low friction factor which, unlike steel or cast iron pipe, remains the same or increases after years of service.

"(3) The pipe and joints are watertight under pressure greatly in excess of the normal pressures for which they are designed and cannot 'blow out.'

"(4) The concrete pipe and specials do not collapse or rip apart under destructive pressure. Floods of water do not escape and cause excessive property damage because the steel tube and reinforced concrete shell successfully resist any tendency for the escape of large volumes of water at the time of failure.

"(5) The concrete pipe is not subject to electrolysis nor is it subject to deterioration from rust.

"(6) The thick shell of concrete is insurance against damage from sudden heavy blows from exterior sources.

"(7) For maintenance and changes in the system, the concrete pipe has its advantages. Sections may be cut out for their replacement by valves or specials with either flange, bell, or spigot joints as desired, and these new joints will be as smooth, strong, and watertight as the original pipe."

[4] Journal of the American Water Works Assn., September, 1938, page 1478.

Adds Block Machine

GRAYSTONE CONCRETE PRODUCTS CO., Seattle, Wash., reports that a second Besser Vibrapac concrete block machine was installed on September 25. President F. M. Kettenring, in commenting on the purchase, said that there has been a considerable increase recently in the use of concrete block for basement walls, in addition to larger quantities going into above grade walls in a wide variety of commercial structures.

To Make Agstone

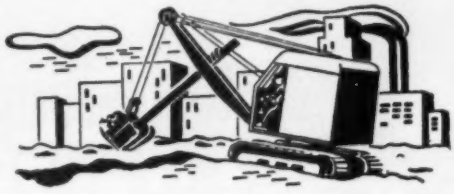
THE MOARK CO., St. Joe, Ark., has plans to establish an agricultural limestone plant at this location as soon as machinery can be obtained. The plant will have a capacity of 300 tons a day.

Raising a BLISTER—

Osgood Dependability Helps Speed Construction on Military Hangars

"Somewhere in England" this blister-type hangar is affording weather protection for the men and materials of our engineer troops. And in the foreground is a construction "warhorse" familiar to Army engineers the world over . . . a dependable Osgood shovel.

Whatever and whenever the job—slogging through mud . . . chipping a runway in the flint-like coral of Pacific atolls . . . hacking a road out of African jungles . . . battling the frozen ground along the Alaskan Highway . . . plugging away at the common-place jobs here at home—rugged, powerful Osgoods are giving memorable wartime performance.



This global service, besides helping to win the war, is an exhaustive proving ground for better peacetime excavating equipment for you.

THE GENERAL EXCAVATOR COMPANY CRANES, DRAGLINES AND SHOVELS DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD CRANES SHOVELS DRAGLINES

THE OSGOOD COMPANY • MARION, OHIO

OSGOOD SHOVELS, DRAGLINES CRANES CRAWLER & WHEEL MOUNTS DIESEL, OIL, GAS, ELECTRIC

Protection from Burn-Outs with PYRASTEEL

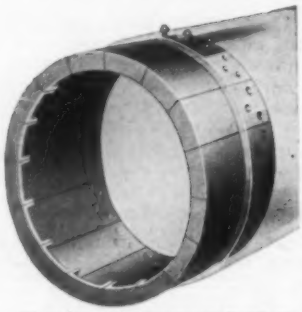
KILN ENDS

Why run the risk of kiln-end "burnouts" that cause serious shutdowns and costly repairs:

Play safe by installing PYRASTEEL Segmental Kiln Ends at both the *discharge end*, as illustrated . . . and also at the *feed end* of your cement kilns.

PYRASTEEL gives long and dependable service at high temperatures . . . as proved in scores of installations throughout the industry.

Write for Bulletin of this Heat-Resisting Alloy



Showing discharge end of cement kiln fitted with PYRASTEEL Segmental Kiln Ends.

Unit segments are easy to install or replace

CHICAGO STEEL FOUNDRY COMPANY

PYRASTEEL for both temperatures

KEDZIE AVE. & 37TH ST. CHICAGO 32, ILL. Makers of Alloy Steel for 30 Years

EVANSTEEL for strength

SYNTRON

"Adjustable Power"

ELECTRIC VIBRATORS

Eliminate arched-over and plugged bins, hoppers and chutes.

Assure a steady, free flow of material.

A model for every problem.

SYNTRON

"Vibra-Flow"

VIBRATING FEEDERS

Rheostat control of flow of sand, gravel, rock, ore, etc., to belt conveyors, ball mills, crushers, etc.

Capacities of from Ounces to 500 Tons per hour.

Write us about your problem

SYNTRON CO., 450 Lexington, Homer City, Pa.

Washington News

(Continued from page 49)

creased from 21 to 30 per cent by the W.P.B. An amendment to limitation order No. L-64 also removes the requirement that metal liner manufacturers file monthly reports on production and shipments on form No. WPB-1600.

Exempt Ready Mix from Renegotiation

Announcement has been made by Executive Secretary V. P. Ahearn of the National Ready Mixed Concrete Association that the War Contracts Price Adjustment Board considered the application of the association dated May 27, 1944, for exemption from renegotiation and has granted the application. The regulation granting exemption is as follows:

Pursuant to the authority given to the War Contracts Price Adjustment Board by subsection (i) (4) of the Renegotiation Act of 1943, the Board, under the provisions of subsection (i) (4) (D) of the 1943 Act, has exempted from renegotiation amounts received or accrued during fiscal years ending after June 30, 1943, and prior to July 1, 1944, under contracts or subcontracts for the making or furnishing of ready mixed concrete.

Lift Roofing Granules Priority

Orders for roofing granules (crushed stone) must be delivered in the sequence they are received by producers without regard to preference ratings, according to a recent War Production Board ruling.

This action was taken by adding roofing granules to List A of Priorities Regulation No. 3, as amended August 22, 1944. List A contains those materials for the delivery of which preference ratings are not valid. Preference ratings for the production and sale of roofing granules had been extended without authorization in the recent past by some persons to help them obtain quicker delivery.

Honor Quarry Man

A PLAQUE will be erected at the new Lexington, Ky., airport as a tribute to the late T. Ward Havely, and as an expression of appreciation of his work in obtaining a modern air field for the city and central Kentucky. The late Mr. Havely was Mayor of Lexington and president of Central Rock Co., Lexington, Ky.

Install Equipment

LEONARD FRY, Mercerburg, Penn., crushed stone producer, recently installed a new Bradly mill and a new 120-hp. Hercules Diesel engine at the Dickey's Station, Penn., plant. His other operations are located at Williamson and Zullinger, Penn.

Pennsylvania Stone Producers Meet

Annual meeting and outing held at Carlisle Country Club near Harrisburg

On August 25, the Pennsylvania Stone Producers' Association held its annual meeting in the Penn-Harris Hotel, Harrisburg, Penn., with President John Rice, Jr., presiding. Fred Earnshaw, president of the National Crushed Stone Association, was called upon for a short talk in which he gave a resume of the discussions at the recent director's meeting of the national association in New York City.

E. W. Bauman of the National Crushed Stone Association, discussed some of the problems which may be involved in meeting future specifications for crushed stone. Executive Director J. R. Boyd of the National Crushed Stone Association, in his talk, referred to the business situation which may be anticipated with the conclusion of the European phase of the war. He also discussed the highway bill before Congress, and suggested that each producer write to his congressman in the matter of securing additional appropriations for his particular State or region.

John U. Schroyer, secretary of the Pennsylvania State Highway Department told the producers that Pennsylvania was ready to spend $40,000,000 immediately at the conclusion of the war and that this expenditure would affect the stone industry immediately.

Mr. Cook of the A.A.A., in his address, told about the agricultural limestone and lime spreading program in Pennsylvania which used 800,000 tons in the first six months of 1944 and pointed out that 1,400,000 tons would be needed next year.

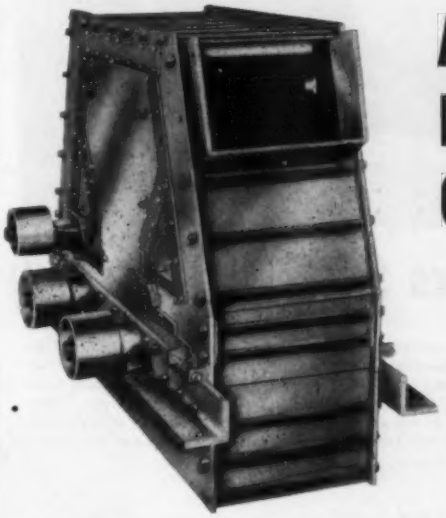
Role of Research

Engineering Director A. T. Goldbeck of the National Crushed Stone Association, spoke about the interesting research work which has been undertaken and is now under way by the association staff. He pointed out that research has a very definite place in opening up new markets for crushed stone.

Citing a number of examples of recent association activities, Mr. Goldbeck said, "Several years before the beginning of the present war, we saw the need for getting basic information which would tell us how to design the macadam or flexible pavement type of road surfaces or airport runways, so that it would support very heavy wheel loads with safety. You can't just arbitrarily decide how thick such road surfaces should be—you must determine as scientifically as possible the required thickness to suit the subgrade and the wheel load. But the basic theory for this determination did not exist, so we spent a considerable amount of time and a great deal of physical effort making load tests on flexible surfaces of different thicknesses to obtain basic facts for the development of a design theory. As a result of the generalization and analysis of our test data, we feel that we can now design the flexible surface to support heavy wheel loads. We have used our design method to assist our producers in the sale of their product. Here was a practical research carried right through from the beginning, involving thousands of careful measurements of load and subgrade pressures, finally resulting in the development of a practical and useful theory which really works and which has helped airport engineers as well as our industry.

"Concrete design has been a subject of interest and considerable discussion for many years. The propor-

NOW— for faster and better crushing



A DOUBLE IMPELLER CRUSHER

New HOLLAND MODEL 3030

Its astonishing efficiency reduces material from 30 in. to an optional minimum of 80% under one inch, in one operation. Handles 100 to 150 tons per hr. with only 50 to 75 hp.

- Operates on new basic principle
- Requires minimum horsepower
- Replaces expensive primary and secondary machinery
- Simplifies maintenance and lowers operating costs per ton
- Also serves as a soft stone eliminator

This is definitely the crusher of tomorrow. It combines the best structural features of present day machines with an entirely new crushing action.

A pair of gigantic impellers are the heart of the New Model 3030. They travel at varied speeds in a clock-wise and counter clock-wise direction with the tops of the impellers moving away from each other. Positive crushing action is by impact against the heavy reinforced steel top, giving thoroughly crushed, cubical particles.

The Double Impeller is a marvel in the simplicity of its construction . . . a perfect "stone hog" for capacity . . . and astounding in effectiveness. Write today for complete details about this new machine. Address Department RP-10.

NEW HOLLAND MACHINE CO.
NEW HOLLAND PENNSYLVANIA

tioning theory that has been most widely advertised has been very harmful to stone. Our own preliminary tests showed that this theory, making use of a general water-cement ratio, compressive strength relationship was not being correctly applied, for stone in general followed a different law than gravel and the departure from the general theory shown by crushed stone concrete was significant enough to be recognized. Extensive tests verified our preliminary observations and finally we developed a method for proportioning concrete (Bulletin 11) which is simple to apply, gives plastic, workable concrete no matter what aggregates are used and, furthermore, when this concrete design method is employed, stone is no longer penalized. This was a large research which to many might seem far afield from the proper work of our laboratory, but it has resulted in a design method of great practical value. It has been used in very large jobs with success and its use is spreading. It will help our industry.

"I could cite a great many different kinds of researches which we have conducted for the benefit of the crushed stone industry, investigations which throw light on many different crushed stone problems. These problems are concerned with the properties of stone sand, the effect of air entraining cements on concrete workability, the effect of sand gradation, tests for railroad ballast, a whole series of tests dealing with the properties of bituminous mixtures which in themselves involve a host of separate problems; problems of concrete durability under adverse weather conditions, airport design and the practical application of our researches to particular jobs involving difficulties placed before us for advice.

Following Mr. Goldbeck's talk, the business session was concluded and the convention adjourned for the outing at the Carlisle Country Club.

DAVENPORT SAVES $25.00 PER DAY

DAVENPORT LOCOMOTIVES are available in STEAM GASOLINE and DIESEL with ELECTRIC or MECHANICAL DRIVE

Examine the following figures and you'll realize what a Davenport Diesel-Electric can do for YOU in major SAVINGS. Here's what Mr. V. O. Johnston, President of The Lincoln Sand & Gravel Co., says about his Davenport Locomotive: "With reference to the savings effected in the operation of our 44-ton Diesel-Electric Locomotive as compared with steam, the figures are as follows:

STEAM	
5 tons of coal @ $4.50 per ton	$22.50
Fireman	5.20
	$27.70
DIESEL	
25 Gallons of Oil @ 8c a Gallon	2.00
Net Savings	$25.70

"We have been operating a ten-hour day the last month or two and the savings are proportionately larger. With steam, of course, we have some expense in coaling up, labor in steaming up, cleaning fires, etc., whereas the Diesel is always ready."

ARMY E NAVY

FREE HAULAGE SURVEY

Our engineers will be glad to receive descriptions of your haulage conditions and submit reliable recommendations designed to effect savings for you.

EXPORT OFFICE BROWN & SITES 50 Church St., New York Cable Address "Brosites"

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION: DAVENPORT, IOWA

Ohio Ready Mix Meeting

(Continued from page 69)

H. E. Swanson, "Rock Products," Chicago, Ill.
W. E. Pohlman, American Aggregates Corporation, Columbus, Ohio.
C. L. Laude, Huron Portland Cement Company, Detroit, Mich.
I. W. Steele, Hilltop Building Material, Cincinnati, Ohio.
F. M. "Doc" Wylie, Diamond Portland Cement Company, Columbus, Ohio.
John E. Keevert, Lehigh Cement Company, Worthington, Ohio.
George A. Mansfield, Huron Portland Cement Company, Detroit, Mich.
A. G. Breckling Coal & Supply Company, Cleveland, Ohio.
W. P. Greer, Universal Atlas Cement Company, Lima, Ohio.
L. L. Wilson, Southwestern Portland Cement Company, Osborn, Ohio.
Joseph H. Kauer, Ready Mix Concrete Engineering Service, Cleveland, Ohio.
L. F. Hemmert, The National Lime and Stone Company, Sidney, Ohio.
H. L. Carder, The Green & Sawyer Company, 218 Market Street, Lima, Ohio.
C. A. Persons, West Side Lumber & Coal Company, Elyria, Ohio.
W. Herbert Rusk, Ready Mixed Concrete Company, Mansfield, Ohio.
Claude L. Clark, Ohio Ready Mixed Concrete Association, Columbus, Ohio.

Sand-Lime Brick Production and Shipments

FOUR active sand-lime block and brick plants reported for August and four for July, statistics for which were published in September, 1944.

AVERAGE PRICE FOR AUGUST

	Plant Price	Delivered Price
Detroit, Mich.	....	$17.00
Saginaw, Mich.	$15.00	....
Grand Rapids, Mich.	....	16.20
Seattle, Wash.	19.50	21.50

STATISTICS FOR JULY AND AUGUST

	*July	**August
Production	1,271,300	1,314,065
Shipments (rail)	212,000	25,000
Shipments (truck)	956,300	1,275,065
Stocks on hand	838,000	625,000
Unfilled orders	1,563,000	1,338,000

*Four plants reporting: incomplete, one not reporting stocks on hand and one not reporting unfilled orders.

**Four plants reporting: incomplete, one not reporting stocks on hand and one not reporting unfilled orders.

Cleaning Drafting Tools

A SOLUTION made of 2 oz. of potassium alum, 2 oz. of citric acid dissolved in 3 oz. of water will clean ink from pens and other drafting instruments.

Improve Handling Methods Speed Production with . . .

Jeffrey

The more difficult and varied the job in the stone products industry, the greater the need for the diversified line of Jeffrey material handling and reduction units, capable of carrying through every step of the process. For high productivity . . . specify Jeffrey.

CHAINS
CAR PULLERS
CONVEYORS
CRUSHERS
ELEVATORS (BUCKET)
FEEDERS
GRINDERS
IDLERS (BELT)
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The Williams "SLUGGER" Crusher and Pulverizer Handles "ONE MAN" Stone • Saves Sledging

Also Makes 1¼", ¾" or Agricultural Limestone in One Operation

CUTAWAY VIEW of "Slugger" showing heavy duty hammers, liners and discs.

By reducing large rock to 1¼", ¾" or agricultural limestone in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Features include—Manganese steel hammers, heavy duty bearings, adjustable breaker plate, hammer adjustments overcome wear, economical to operate.

The "Slugger" is built in Seven Sizes—from 30 to 150 horsepower — write for illustrated bulletins today.

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● The place to make provision for the diverse types of stone products demanded today is right at the crusher. And the one crusher for efficient reduction to the desired finenesses and quality is the American Crusher. By the fine job they do year after year Americans are a sure step toward maximum production at lowest overall operating costs throughout your entire plan.

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E. C. MACHIN COMPANY

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COMMONWEALTH BUILDING ALLENTOWN, PA.

Cement Industry of Spain

By PATRICIO PALOMAR†

UNTIL ABOUT FORTY YEARS AGO there was no portland cement industry in Spain, although there were a great number of factories producing Roman cements and limes, some of which were hydraulic. About 100 vertical kilns were in use and the system employed was similar to that used by the Romans some two thousand years ago.

Towards the end of the 19th century the first portland cement factory was erected, and shortly thereafter two more factories were installed. Around the year 1905 total production was about 100,000 tons yearly. In 1923, with eighteen factories in operation, capacity reached 1,000,000 tons yearly, and in 1928, due to important public works and an increase in general construction, it was necessary to import cement. Other factories were soon built, some on the sites of huge hydroelectric power projects, others at sources of raw material supply or near centers of coal mining, and in 1936 capacity had reached 2,600,000 tons yearly. For some special construction jobs grinding mills were installed and clinker shipped there to be ground to cement, some with and others without additions of pozzolanic materials to produce special cements for given uses.

Before the War

In 1936 there were 29 portland cement factories operating throughout Spain, with 49 rotary kilns and 32 vertical kilns using different systems of operation. In a number of the modern plants waste-heat boilers were in use, as well as electrical dust precipitation and other modern installations comparable with the most up-to-date plants in Europe. After observing results obtained at the Rudesdorff plant in Germany where a Lepol kiln was in operation, Spanish engineers installed three of the Lepol type of kiln in Spain, these being among the first of four Lepol kilns to operate anywhere in the world. After 20 years of experimenting in France and other countries, in 1934 the Basset process for the simultaneous production of pig iron and portland cement in the rotary kiln was put into effect in Spain with fair results.

Position in World Production

It is interesting to note that the League of Nations considered cement production as an economic indication

*Published in Barcelona, 1940.
†Industrial Engineer and Cement Manufacturer.

of great importance, and made a number of special studies based upon this industry. At one time, during which period economic trade pacts were being made among various nations, the production of cement in each country was adopted as the factor for determining the economic prosperity of each country. In 1927, for example, the United States produced 387 kilos of cement per inhabitant, while Spain produced but 58 kilos. On the other hand, where the production of cement in the United States amounted to 4.3 tons per square kilometer, the production in Spain was 2.5 tons per square kilometer.

Special Cements

Natural cements, hydraulic limes and similar products are produced in large tonnage. In the Catalana region alone, more than 400,000 tons of these products are made yearly. Other cements, derived of portland cements, include the pozzolanas, utilizing in some cases local pozzolana materials, as well as the imported Italian pozzolanas. Total production of these cements is naturally much less than that of portland cements.

Effects of the Internal War

At the beginning of the civil war, of the 27 factories then in operation, only five were situated outside the territory dominated by the Red Government. Early in the war the majority of the cement plant executives, managers, directors, chemists, engineers and general plant technicians, were either executed or thrown into prison. Lack of direction, organization, transportation, together with shortage of coal, etc. resulted in paralyzing most of these plants early in the war. Some of the plants were located on battle fronts and suffered as a result of bombardments. At the end of the war factories having a capacity of 1,500,000 tons yearly were in the zone dominated by Franco, and most were in operation, while other factories having a yearly capacity of 1,000,000 tons, situated in the zone dominated by the Red Government, were all out of commission. A few months after the war ended most factories were operating, but a year was required to put plants in repair and arrive at normal operations. Most of the machinery in Spanish cement factories came from Germany, Denmark and the United States and the same was true as concerned spare parts, etc.

Now, considerable of the spare parts are made in Spain, which include mill linings, grinding media, refractory brick, gears, explosives and other materials formerly imported. The main importations now consist in lubricants and paper bags. Formerly jute bags were used to a considerable extent.

Quarry Title Questioned

SPOKANE PORTLAND CEMENT CO., Spokane, Wash., has been in the middle in a legal fight as to the legality of title transfer of the big quarry near Marble, Wash., from which the government has been taking stone for a magnesium plant. The cement company held title to the property but the government recently had taken it over under condemnation proceedings. Maj. Richard C. Parnell, now in the armed services, purchased a mortgage on the property for $30,000 from W. G. Wrenn of Kansas City who had obtained the mortgage from M. G. Swanson in payment for the property involved. After Maj. Parnell foreclosed the mortgage he sold the sheriff's certificate of sale to W. N. Bennett, now deceased, who in turn disposed of the property to the Spokane Portland Cement Co. It is now contended by counsel that M. G. Swanson was mentally incompetent to mortgage his property.

Special features

of the

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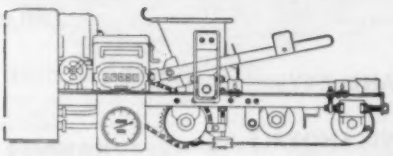
WEIGHT RECORDING FEEDER



1—Records the weight fed by

(a) printed card—both cumulative and batch

(b) recording chart—a month's record on one roll

(c) visual dial reading in pounds or tons

2—Remote controls

(a) rate changed by push button station

(b) recording attachments located in control room

3—Designs to suit your problem

(a) two or more feeders interlocked for proportioning

(b) metal belt for handling materials at temperatures above 250° F.

(c) magnetic pulley to remove iron from material

Write for Bulletin 43

HARDINGE

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Concrete Pipe Concern Builds Ships for War

By HAROLD J. ASHE

ONE of the most unique conversions of a plant to the war effort has taken place at Baldwin Park, Calif., where a company normally engaged in the production of concrete pipe has been converted to the building 175-ft. freight-passenger ships for the United States Army.

The United Concrete Pipe Corporation of which B. J. Ukropina is president has converted its Baldwin Park offices and yards into a ship production line 45 miles inland from Long Beach harbor.

The steel ships are built in sections at the Baldwin Park plant; then they are trucked to the harbor in convoys. The assembling yard is at 1700 W. Ninth street, Long Beach, Cal. The assembling yard is 2250 feet long. The sections are assembled on building slabs, moved onto the largest marine railway on the West Coast and launched.

The company is unique in other respects. It is the only shipbuilder on the Pacific coast that sandblasts rust from every piece of steel before painting. It employs no women in its production department, either at the fabricating plant or at the assembly yard.

The largest single section ever built at Baldwin Park was a 40-ton deckhouse that required a huge truck and trailer to move it to the harbor and required three cranes to move into place for assembling.

The marine railway is, in itself, an innovation in shipbuilding. It has a 1500-ton capacity and can lift from the water for repairs a ship 225 ft. in length with a 40-ft. beam. The railway extends 488 ft. under water and 1400 ft. on land. Milton Shedd, engineer for the corporation, designed it.

The ships being built by United are of a new type designed for inter-island combination freight and passenger use by the Army. They have a speed of 13 knots plus and trial runs have borne out this rating.

Two vessels have been launched so far. The first one required three months to build, but schedules are being worked out to lower this figure.

Besides Mr. Ukropina, other officers and executives include: Steve Kral, T. P. Polich and E. E. Hall, vice-presidents, Cecil W. Drake, a marine engineer, as administrative manager; F. O. Mjellem, works manager; Harold Pope, assistant works manager; Roy Chinnichi, superintendent of hulls; Paul Preston, chief engineer, and George Gammon, superintendent of machinery.

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BOILERS

3—80 HP. Houston, Stanwood & Gamble, locomotive type boilers. 125 lb. pressure.

AIR COMPRESSORS

1—Ingersoll-Rand Duplex Air Compressor, Type XB, 582 cu. ft., motor driven.
1—Ingersoll-Rand Imperial, Type XB-2, Duplex Air Compressor, 12"x7½"x12".
1—Ingersoll-Rand, 2-stage, Type XCB-2, Air Compressor, 15"x9½"x12", 676 cu. ft., 100 lb. pressure.

COOLERS AND DRYERS

1—7x56 ft.
1—10x90 ft. And others.

CRANES AND SHOVELS

1—P & H 1-yd. Shovel, Gasoline, Reconditioned.
1—Locomotive, 4-wheel, 10-ton, 25' boom, Brown Hoist Co.
1—Overhead, 10-ton, 74'-4" span, air operated.

CRUSHERS

2—No. 5 Gates Gyratory Crushers, Style D. Others—various types and sizes.

STEEL GUY DERRICK

1—100' mast, 90' boom, 3 drum Clyde Hoist, 2 Drum Swinger.

DIESEL GENERATORS

1—Diesel Generator Set, 360 HP., Fairbanks-Morse Diesel, 6 cylinder, Model 32, complete with auxiliaries, 257 RPM., direct connected to a 250 KVA Fairbanks-Morse Generator, Type D, 3 phase, 60 cycle, 230 volts. V-belt drive to exciter. Complete with panelboards, etc. And others.

DRILLING EQUIPMENT

1—No. 40 Ingersoll-Rand Drill Sharpener and Accessories.
1—No. 33 Ingersoll-Rand Layner Drill Sharpener.
1—Improved Type No. 23 electric power Loomis Machine Company Clipper Drill, complete with motor.
2—Ingersoll-Rand DCR No. 430 Drills.
2—Denver-Gardner Company (Turbo-Waugh) No. 37 Drills.
4—Denver-Gardner Company (Denver-Waugh) No. 95 Drills.

FEEDERS

2—Bailey Pulverized Coal Feeders, Type No. 2, complete with steel hoppers, 8½ ft. dia. x 12 ft. cone bottom.

GRINDING EQUIPMENT

2—5½'x22' Allis-Chalmers Compeb Mills.
3—5½'x30' F. L. Smidth Tube Mills. Silex Lined.
1—5'x22' Tube Mill.
1—5'x10' Tube or Ball Mill.
1—4-roll Raymond Mill.
3—Giant Griffin Mills.

CEMENT KILN GUNS

2—Remington Arms Cement Kiln Guns.

HOISTS

1—S. Flory Mfg. Co. single drum Hoist. Handles 11 ton car up 12% grade 500 ft. per min.

KILNS

1—8x9½x180 ft.
And others.

LOCOMOTIVE AND CARS

1—4-ton Vulcan Iron Works, Class AW-4, Worm Gear Gasoline Locomotive, 36" gauge.
6—5-yd. Koppel 2-way Dump Cars, 36" gauge.

HAMMER MILLS

2—Ajax Hammermills, size 8XT-11 (1-R.H., 1-L.H.). Handles stone 300 tons per hr. 8" to 1½" each. Also spare parts.
1—Williams No. 6 Hammermill.

ELECTRIC MOTORS AND MG SETS

Large stock, rebuilt, AC or DC. 25 and 60 cycle.

SYNCHRONOUS MOTORS

1—1000 HP., 25 cycle, 2300 V., 150 RPM.
2—1250 HP., 25 cycle, 2300 V., 150 RPM.

ROAD ROLLER

1—Austin-Western "Autocrat" 10-ton with compressed Air Scarifier. New 1941. Gasoline.

AIR SEPARATOR

1—14 ft. Sturtevant Air Separator. New 1941.

MAGNETIC SEPARATORS

3—Stearns High-Duty Magnetic Separators, 21" dia., 48" face. New 1939 and 1940.

TRACK SCALE

1—Homestead (Carnegie-Illinois Steel) Standard Track Scale, 45'-100 ton capacity. Complete.

TANKS

1—6700 bbl. capacity Oil Storage Tank. Others up to 55,000 bbls.

TURBINE

1—100 HP. Westinghouse Turbine, 2700 RPM., direct connected to 100 HP. Westinghouse Gear Reducer. Ratio 3 to 1.

MANY OTHER ITEMS

WANTED { Cement Manufacturing Equipment / Diesel and Generating Equipment

WEBBER EQUIPMENT CO.

New and Used Equipment

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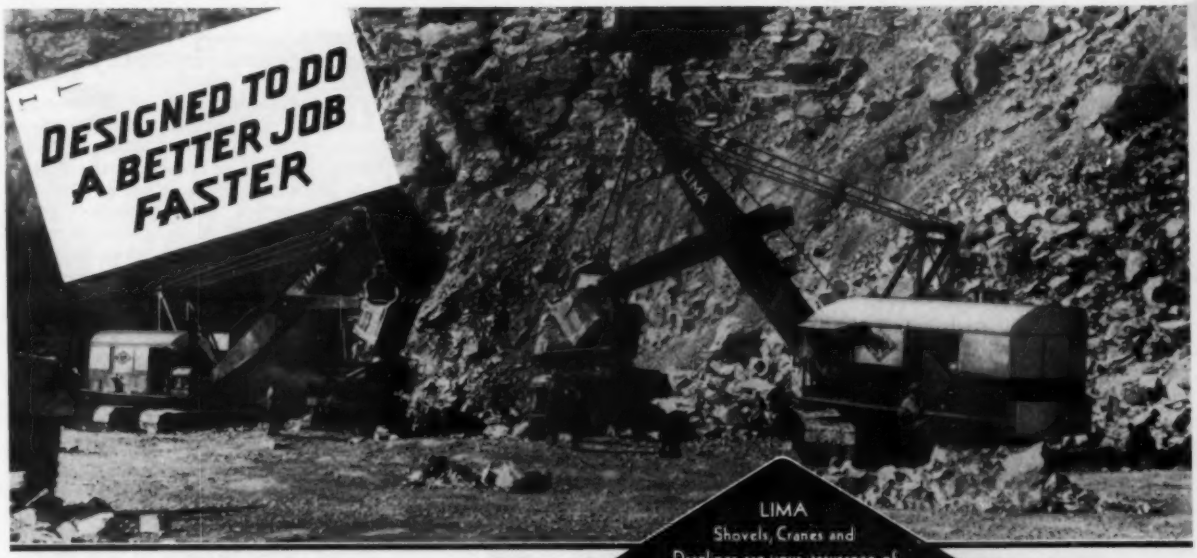
Mica Dream Comes True

C. W. DIETZ of Sylva, N. C., foreman of the Jasper mine, owned and operated by Harry E. Buchanan, Hendersonville, N. C., had a dream in which he discovered a very rich vein of mica. In his dream the mica was very large and of good quality. The next morning, in accordance with his dream, he took his pick and went to the top of a mountain across from the Jasper mine. He dug down a little, with no luck, but before he had dug very far he found a quantity of block mica, with good quality and in such quantity that he was able to dig about 500 lbs. When Mr. Buchanan was notified, according to the local account, mining operations were started and in two weeks' operations with two men about three tons of valuable mica were recovered. The foreman in his first day's pick and shovel operations got out nearly a $1,000 worth of mica.

Cut Back Magnesium

INTERNATIONAL MINERALS & CHEMICAL CORPORATION, Chicago, Ill., has been notified by W.P.B. that effective September 5 there will be a 40 percent cut-back in primary ingot production which will result in eventual shut down of plant operated at Austin, Texas. Basic Magnesium, Inc., in Nevada faces a similar cut-back.



LIMA LOCOMOTIVE WORKS,
INCORPORATED
Shovel and Crane Division
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LIMA
Shovels, Cranes and Draglines are your assurance of greater output and fewer delays on the big jobs that you are planning for the future—and that is not all, the maintenance and lubrication cost of LIMA Shovels, Cranes and Draglines is surprisingly low too, due to their many practical features. If you plan to buy a new shovel, crane or dragline, for peace time work, LIMA will give you greater speed, bigger output and more efficient operation. Write or wire today for descriptive bulletins.

"A TYPE AND SIZE FOR EVERY JOB"

SHOVELS
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BALANCED RODS
Another
PLUS FEATURE
IN ALL
WISCONSIN
Air-Cooled
ENGINES

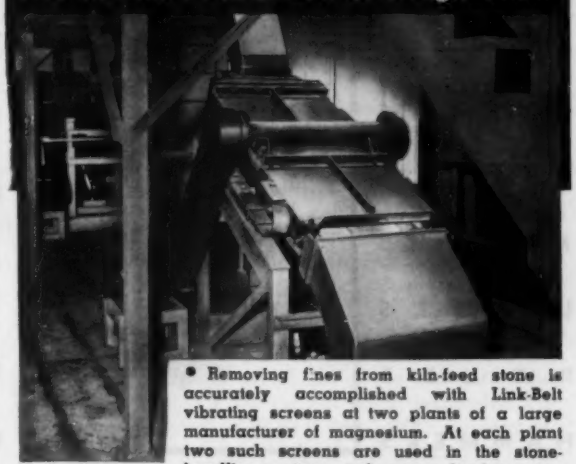
Every connecting rod, in every Wisconsin Air-Cooled Engine, is precision-balanced to eliminate all weight variations in excess of ¼-ounce per rod.

This is admittedly cutting it pretty fine for a rough-and-ready heavy-duty engine . . . but not too fine for these fine engines. Smooth operation, reduction of vibration to a negligible minimum, prevention of excessive wear . . . these are factors that can be controlled only by the most meticulous care and attention to such small details as this in building an engine.

The *value* of this attention comes into play when a Wisconsin Air-Cooled Engine powers your equipment.

Most H.P. per pound
WISCONSIN MOTOR
Corporation
MILWAUKEE 14, WISCONSIN U S A
World's Largest Builders of Heavy-Duty Air-Cooled Engines

LINK-BELT *Vibrating Screens*
Aid in the Production of Magnesium



• Removing fines from kiln-feed stone is accurately accomplished with Link-Belt vibrating screens at two plants of a large manufacturer of magnesium. At each plant two such screens are used in the stone-handling system, each screen having a capacity of 17½ tons per hour. Link-Belt screens are serving many varied industries, where screening operations are essential. When you need a vibrating screen—specify Link-Belt. Send for Catalog No. 1762.

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2045 W. Hunting Park Ave., Philadelphia 40.
Offices and distributors in all principal cities

WRITE TODAY! LINK-BELT Vibrating Screens

Organize Postwar Public Works Council

POSTWAR PUBLIC WORKS COUNCIL was formed recently in Indianapolis for the purpose of stimulating postwar planning of public works projects throughout the State of Indiana. The aim of this council is to assure the construction of essential projects immediately upon conclusion of the war, and thus avoid the creation of another W.P.A.

The Council will sponsor all types of public works and will extend every effort to have them put on the planning boards so that work can be started as soon as the war is over. All public officials, contractors, and manufacturers will be asked to support the movement.

Credit for the creation of the Council goes to the Highway Materials and Equipment Association of Indianapolis which started the movement at the Purdue Road School last January.

Executives of the Council are: C. Dana Ward, chairman of the Council who is president of the Highway Materials and Equipment Association; W. M. Holland, vice-chairman, executive secretary of the Indiana Highway Constructors, Inc.; W. H. O'Neall, secretary, vice-president of Armco Drainage and Metal Products, Inc.

The executive committee is composed of the officers mentioned as well as the following: William Rohlwing, district engineer of the P.C.A. of Indiana; Otto Keeler, Indiana representative for Kentucky Rock Asphalt Co.; T. R. Johnston, director of Purdue University News Bureau; Ray Pike, director of Indiana Economic Council; V. E. Trimble, sales manager for J. D. Adams Co.; Bruce Short of Hugh J. Baker Co.; E. W. MacAllister, president of MacAllister Tractor Co.; and Fred G. Johnston of Construction Digest.

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CRAWLER ROLLERS
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DRAG LINE PARTS

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Precast Bridge Beams

IN THE RECONSTRUCTION of certain weak bridges in Great Britain use is being made of prestressed, reinforced concrete beams, constructed and stored by the Ministry of War Transportation as reserve material for emergency bridge construction.

According to *Highway Research Abstracts*, the main reinforcement consists of 0.2-in. hard steel wire laid parallel to the length of the beam near its lower edge. The wires are kept under tension during the casting of the beam, and are released at the end of the curing period. Contraction of the wires on being released compresses the concrete along the lower flange, the beam assuming a slightly arched form. Prestressed members of this type must be lifted and supported from the ends only and with the convex surface uppermost. Descriptions are given of the reconstruction of the decks of two bridges over railways. The clear skew span of the first bridge (42 ft. 6 in.) would normally require 46-ft. beams, but the use of 44-ft. beams, the most suitable length available, was rendered practicable by placing them at slight angle to the line of skew, the resulting triangular spaces at the parapets being bridged by concrete slabs. The box-shaped cross-section of the beams permitted the joints to be filled and water-proofed with gummed cement. A reinforced concrete carriageways and two footways were provided. For the second bridge, which had a clear skew span of 45 ft. 10 in., 54-ft. H-section beams were used.

To Make Pipe

ACME FIREPROOF BRICK CO., Lima, Ohio, plans to build a new plant to be located at the quarry site of the Western Ohio Stone Co., near the east limits of Lima. Construction should be completed this winter and the new plant should be in operation early next year. In addition to manufacturing masonry units, this company will make concrete pipe and will operate a ready mixed concrete plant. A Besser Vibrapac will replace the Besser pallet stripper now in use, which will triple the present capacity.

For Quality

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CUT GEARS-CUT RACKS
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and Dependability

Our large modern plant, fully equipped and in mass production can supply your requirements for Gears, Sprockets and Racks, in every particular.

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Fastest Growing Gear Plant in the Middle West.

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PLYMOUTH LOCOMOTIVES

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PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Co. • PLYMOUTH, OHIO, U. S. A.

DENVER "SUB-A" FLOTATION CELLS

Flotation is slowly being applied to beneficiate and concentrate various products in the chemical field which cannot be obtained by other methods. The Denver "Sub-A" is standard the world over because it has a number of exclusive advantages. Bulletin No. F11-B.

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DENVER EQUIPMENT COMPANY, 1400 17th St., Denver, Colorado

NEW LEADER Truck Body Type

LIME SPREADERS

Can Now Be Purchased Without Triple AAA Certificates or Priority

THE above picture shows a rear view of the new model NEW LEADER marl and lime spreader. This spreader is equipped with an extra wide conveyor and two distributor discs and is strictly a one-man spreader. You will be able to haul wet lime or marl and, due to the large opening in the back end of the spreader, material will always feed onto the distributor disc evenly.

This spreader has many outstanding features. Both gear boxes driving the distributor discs are equipped with cut steel gears and ball-bearings running in a dust-proof and oil-tight gear case. The large gear box driving the wide chain conveyor is equipped with a steel ring gear and pinion and a thrust bearing also running in a dust-proof and oil-tight gear case. Bearing hangers are placed underneath the distributor discs; these are also equipped with ball bearings. This helps to carry the weight of the distributor discs and the load, the weight not being suspended from the gears in the small gear box. With this arrangement you are assured longer lived gears. The framework of the spreader is of hardwood.

These spreaders can now be purchased without priority or certificates of any kind. Write us for any additional information, also prices.

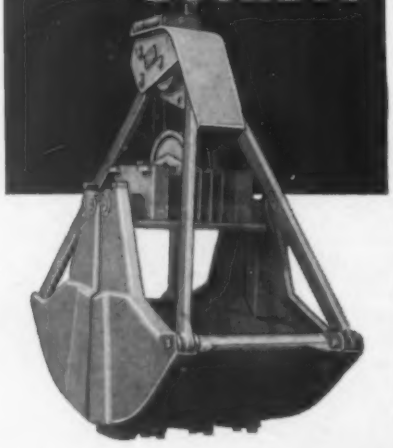
Write today for latest catalog

HIGHWAY EQUIPMENT COMPANY, INC.

Manufacturers of the World's Most Complete Line of Spreaders, Including Lime Spreaders, Sand and Cinder Spreaders, Chip Rock, Clay and Dirt Spreaders.

CEDAR RAPIDS, IOWA, U. S. A. **Phone 32017-32018**

New JOHNSON all-welded BUCKETS



New and exclusive Johnson features give this new streamlined bucket efficiency-promoting and life-prolonging advantages in all centers of action.

Needle Bearings Sealed Against Dirt

All-Welded Construction Reduces Digging Resistance

Its all-welded construction eliminates power-wasting bolts and rivets . . . provides greater stability through proper weight distribution.

A renewable lip edge bar, of durable manganese steel, gives greater digging efficiency and many times the life of the ordinary steel lip construction.

Renewable Manganese Steel Lip Edge

Large Diameter Sheaves Increase Rope Life

Guide sheaves replace conventional cross-rollers . . . greatly reducing cable wear. Needle bearings (protected against dirt by special synthetic rubber seals) are used on all closing sheaves.

General Purpose Type (½ to 1½ yard capacity) in stock for immediate delivery to U. S. and Canadian contractors with required Government authorization. The line also includes Rehandling Buckets ½ to 2½ yards, Heavy Digging ½ to 1½ yards.

Get Data on Johnson Bins —Batchers— Ready-Mix Plants

The C. S. Johnson Company
Champaign, Illinois

Indiana's Pavement "Ballast"

New specifications of State Highway Department require subgrade treatment

NEW SPECIFICATIONS adopted September 15, 1944, by the Indiana State Highway Department are listed below, showing the broad range of materials suitable for subgrade treatment of concrete pavements. Experiments to determine these specifications were conducted by the Testing Laboratories of the Indiana Highway Department, under the supervision of F. F. Havey, testing engineer.

For some time ROCK PRODUCTS has agitated for subgrade treatment of concrete pavements, as shown in the editorial page in both the Oct., 1943, and Dec., 1943, issues and in an article on page 65 of the January, 1944, issue. Experience has shown that concrete pavements must have proper drainage in order to withstand the pounding that they receive from heavy traffic and the pumping and freezing action due to capillary water collecting under the pavement.

The State of Indiana has had considerable experience with pavement breakage due to pumping action. Movies have been made showing the results when heavy trucks ride over a section of pavement that has collected water on the subgrade with no drainage outlet. A pumping action occurs which shoots water and mud from under the pavement, eventually leaving a bare space, which allows the concrete to break and disintegrate. These new specifications providing for a sub-base of sand, gravel, or stone, will do much to remedy these conditions.

The specifications will open a new field for the producers in the State of Indiana, since they are broad in scope and will utilize materials that in some cases would not be suitable for other uses.

The new specifications follow:

The subgrade material will be placed in varying thicknesses according to the type of soil encountered. The average thickness will be from five to seven inches, extending to a thickness of 15 inches in critical areas. When the subgrade material is only placed the width of the pavement, drains will be provided to carry the collected water across the shoulder to the ditch line. In other cases, the treatment will extend across the shoulder to the ditch line.

Magnesite Output Up

PRODUCTION of magnesium raw materials for the manufacture of magnesium metal, basic refractories, and for other essential commodities expanded in 1943, according to a recent report of the Bureau of Mines. The mine output of crude magnesite reached the record quantity of 754,832 short tons valued at $6,071,596, compared with 497,368 tons valued at $3,874,334 in 1942. Demands for refractory brick were so heavy that magnesite and sea-water sources combined were insufficient to satisfy the periclase requirements, and much refractory brick was made with a lower periclase content than usual.

Dead-burned dolomite sold by producers in 1943 totaled 1,276,725 tons, valued at $11,243,017. This compares with 1,229,357 tons valued at $11,243,017 in 1942.

Install Roll Crusher

NATIONAL LIME AND STONE CO., Lima, Ohio, will install a roll crusher this winter to increase their present production of finely graded limestone.

REVISED SPECIFICATION FOR GRANULAR SUBGRADE TREATMENT MATERIAL REQUIRING DRAINAGE

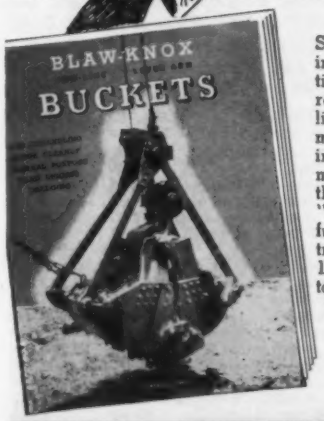
This type Subgrade Treatment Material shall consist of Class A, B, or C, gravel, sand, crushed stone or air cooled blast furnace slag conforming with any of the gradation requirements listed in the following table:

Sieve Size on Which Substantially All Material Passes	Total Percents Retained on Sieves Having Square Openings									
	2½"	2"	1½"	1"	¾"	No. 1/2	No. 4	No. 8	No. 30	No. 200
2" approx. top size	0	0–5	2–25	10–40	†15–50	20–60	†40–75	50–85	75–95	*95–100
1½" approx. top size	0	0–5	2–25	10–40	15–55	†35–75	50–85	75–95	*95–100	
1" approx. top size	0	0–10	2–25	10–40	30–70	45–80	70–95	*95–100		
½" approx. top size	0	....	....	0–10	10–50	30–70	60–90	*95–100		
No. 4 approximate top size	0	....	....	....	0–10	5–55	40–85	*95–100		
No. 30 approximate top size	0	....	....	....	....	....	0–10	*95–100		

*The amount of material passing the No. 200 sieve shall not exceed one-half the amount passing the No. 30 sieve.

†May be omitted without materially affecting gradation.

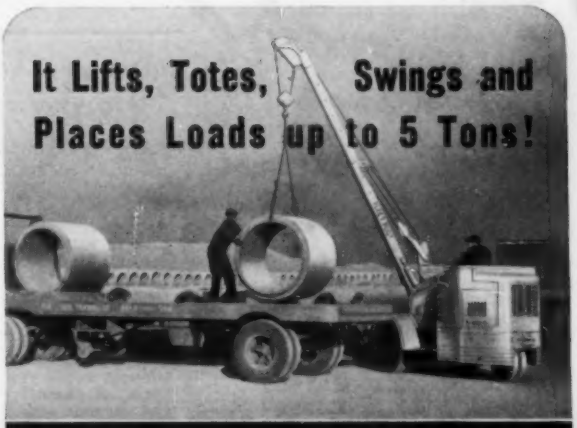
(This type subgrade treatment material is not to be used unless drainage is provided.)



Sealed ball bearing sheaves in the lever arm reduce lost time and expense of bearing replacement, increase cable life and reduce friction, materially improving operating efficiency. This, and many other better features, that make BLAW-KNOX the "wise" buy in buckets are fully explained and illustrated in NEW CATALOG 1757. Send for your copy today.

BLAW-KNOX DIVISION
of Blaw-Knox Company
Farmers Bank Bldg.
Pittsburgh, Pa.

BLAW-KNOX
BUCKETS



JAEGER "FLEET FOOT" CRANE-LOADER

Can travel 12 m.p.h., turn in 10½ ft., climb any ramp—hoists faster than 1 ft. per second and swings 12-18 ft. boom 90° to either side without outriggers for loading and accurately placing up to 10,000 lbs. Nimble, powerful, safe (no load ever over operator). Tier loader attachment if desired. Send for Specification CL-44.

THE JAEGER MACHINE CO. 603 DUBLIN AVENUE COLUMBUS 16, OHIO

Hoists, Winches, Air Compressors, Truck Mixers, Mixers, Centrifugal Pumps

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AN ALL-TIME HIGH IN

from 3,380 in January, 1934, to 6,157 in June, 1944 (A. B. C. Statements). That's GROWTH!

1. Largest Individual Paid Mail Circulation
Plus 2. Buying Power Preference
Plus 3. Editorial Leadership

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ROCK PRODUCTS CIRCULATION

309 W. JACKSON BLVD. CHICAGO 6, ILLINOIS

Uniform Separation

Chemicals—Metallics—Non-Metallic Minerals

The new model GAYCO Centrifugal air separator makes possible the uniform and increased recovery of fine material within a range of 40 to 400 mesh.

- Greater Capacity
- Cleaner Tailings
- 99% Through 325 Mesh
- 25% to 30% greater recovery of fines.
- Not affected by variation in speed or rate of feed.

Manufacturers also of "Reliance" Crushers, Screen, Elevators, Conveyors, Bin Gates, Grizzlies. Complete crushing, screening and washing plants for crushed stone, sand and gravel.

Universal Road Machinery Co.

RUBERT M. GAY DIVISION 117 Liberty St. New York 6, N. Y.
Canadian Representative: F. H. Hopkins & Co., Ltd., Montreal
FACTORY & LABORATORY, KINGSTON, N. Y.

Financial

RECENT DIVIDENDS

Arundel Corp.	$ .25	Oct. 2
Bessemer Limestone & Cement Co. pfd.	.75	Oct. 1
Dolese & Shepard Co.	1.00	Sept. 30
Lehigh Portland Cement Co.	.25	Nov. 1
Lehigh Portland Cement Co. pfd.	1.00	Jan. 2, 1945
Lone Star Cement Co.	.37½	Sept. 30
Pacific Portland Cement Co. 6½% pfd. (p100) (arrears)	1.00	Oct. 27
Southern Phosphate Co.	.10	Sept. 29
Superior Portland Cement Co. Cl. A	.82½	Oct. 2
U. S. Gypsum Co.	.50	Oct. 2
U. S. Gypsum Co. pfd.	1.75	Oct. 2

•

THE WARNER CO., Philadelphia, Penn., has called its 1st 6s, 1951, on October 2, 1944. This issue was mentioned in connection with previously announced refinancing.

•

CERTAIN-TEED PRODUCTS CORPORATION, Chicago, Ill., reports net income of $290,077 for the six months to June 30, 1944, after all taxes and charges. For the same period in 1943, the net profit was $240,676. Net sales in the first six months of this year were $10,158,559 as against $9,397,621 for the first six month in 1943.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION, Chicago, Ill., has presented the following consolidated income account for the years ended June 30:

	1944	[4]1943
Net sales	$27,348,667	$22,477,375
Cost of sales	20,362,131	16,363,323
Selling, expen., etc.	2,305,850	2,048,867
Depreciation, etc.	924,499	667,443
Depletion	463,068	366,435
Patents, etc., amor.	93,243	56,540
Operating profit	3,199,876	2,974,767
[1]Other income	185,880	124,333
Total income	3,385,756	3,099,100
Interest	246,077	257,060
State inc. taxes	63,227	60,057
Fed. income tax	606,018	1,175,000
Exc. profits taxes	11,950	72,159
Post-war tax cred.	cr 1,195	cr 7,216
Extraord. income	[2]dr443,642	[2]539,698
Net income	2,016,037	2,081,738
Prefered divs.	394,920	394,920
Common divs.	499,319	467,324
Surplus for year	1,121,798	1,219,494
Times chgs. earn.:		
Before inc. tax	11.96	14.16
After inc. tax	9.19	9.10
Times chg. & pfd. divs. earned	3.53	3.59
Times pfd. divs.	5.10	5.27
Earn., pfd. share	$20.42	$21.09
No. of pfd. shares	98,730	98,730

[1]Includes profit on sale of fixed assets, net: 1944, $85,992; 1943, $44,434.

[2]Profit on sale of securities (Phosphate Recovery Corp., $575,000; miscellaneous securities, $10,525), $585,525; less $45,827 charges for refinancing premium and expenses; net, $539,698.

[3]Loss on sale of phosphate ore lands.

[4]Adjusted.

SCHUMACHER WALL BOARD CORPORATION, Los Angeles, Calif., reports a net income, after taxes, of $40,025 for the three months to July 31, 1944. This compares with $35,715 for a like period ended July 31, 1943.

•

POTASH COMPANY OF AMERICA, Los Angeles, Calif., released the following information on its income account for the years ended June 30:

	1944	1943
Sales	$11,392,022	$10,011,827
Cost of sales	6,866,460	6,098,611
Selling, etc., expen.	863,844	811,085
Deprec. & amort.	536,682	448,428
Depletion	118,890	103,644
Operating profit	3,006,146	2,550,060
Other income, net.	25,391	16,030
Total income	3,031,537	2,566,090
Income taxes	526,617	413,285
Excess prof. tax	750,000	810,000
Post-war tax cred.	cr 75,000	cr 80,000
Post-war, etc., res.	245,000	215,000
Net income	1,584,920	1,207,805
Dividends	1,099,468	1,099,468
Surplus of year	485,452	103,337
Prev. earn. surpl.	2,388,843	2,280,506
Prior yrs. inc. tax.	.....	cr 200,000
Post-war, etc., res.	.....	200,000
Earn. surplus, 6-30	2,874,295	2,388,843
Earned per share	$2.88	$2.20
Number of shares.	549,734	549,734

Buy Stone Concern

QUARRYVILLE LIME & STONE CO., Quarryville, Penn., has been purchased by D. M. Stoltzfuss & Son, Talmage, Penn.

HAMMOND MULTI-WALL PAPER BAGS

HAMMOND Better bags WELLSBURG, W.VA.

Sewn and Pasted Open Mouth and Valve Paper Bags. Your Inquiries Invited. WRITE TODAY!

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FOR DIRECT FIRING KILNS AND FURNACES

FOR RAW MATERIAL, CLINKER AND MISCELLANEOUS MATERIALS

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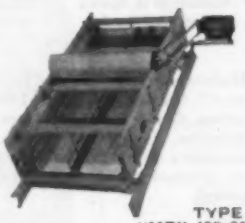
GIVE BEST RESULTS

● GUARANTEED to give you best results on your most difficult separations. UNIVERSALS are of rugged yet simple construction, lowest in first cost and in maintenance. UNIVERSALS have been tried and proved in 25 years of dependable service.

If you haven't already done so, by all means send for Catalog No. 107, containing 32 pages on Screens and Screening.



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RACINE — WISCONSIN

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WORLD'S BEST 3RD AXLE

CARRIES two payloads in one.
SAVES in first cost (up to 40%), on insurance (up to 50%), fuel costs (up to 20%), tires (50% to 100% longer life), road time (up to 20%), breakage of fragile loads, license fees, dead weight, maintenance costs.
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DOUBLES YOUR TRUCK CAPACITIES

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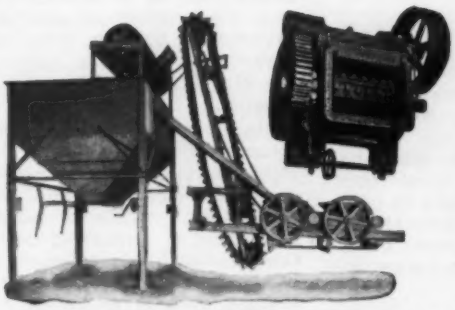
NATIONWIDE SALES & SERVICE
THRU TRUCKSTELL DISTRIBUTORS

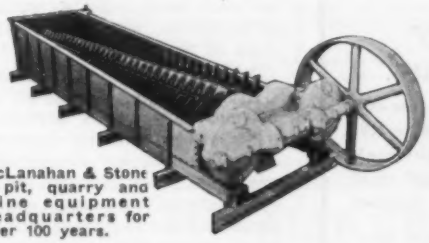
McLANAHAN

SCREENS • CRUSHERS

COMPLETE PLANTS



McLanahan equipment will prepare your plant for more business. Single and double roll and jaw crushers, hammermills, super dry pans — steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, and hoists—complete portable, semi-portable and stationary crushing, screening, and washing plants for different capacities of any material.



McLanahan & Stone — pit, quarry and mine equipment headquarters for over 100 years.

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BELT LACING and FASTENERS for transmission and conveyor belts

"JUST A HAMMER TO APPLY IT"

ALLIGATOR

Trade Mark Reg. U. S. Pat. Office

STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

FLEXCO HD

BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

Sold by supply houses everywhere

"CONVEYOR BELTS EASILY FASTENED"

FLEXIBLE STEEL LACING CO.

4684 Lexington St. Chicago, Ill.

BUILT TO BUCK ABRASION!

For longer service life in vibrating and shaking screens handling abrasive material, use Hendrick High Carbon, Heat Treated Perforated Plate. Heat treating of this high carbon steel greatly increases resistance to abrasion—substantially lengthening screen life.

Tailor-made to your requirements, Hendrick High Carbon, Heat Treated Steel Perforated Plate is furnished with any shape or size of opening—round, square, hexagonal, slotted, or Squaround—in every type mesh and any desired thickness. Inquiries promptly answered.

HENDRICK MANUFACTURING CO.

47 Dundaff St., Carbondale, Pa.

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PLEASE CONSULT TELEPHONE DIRECTORY

Makers of Elevator Buckets of all types. Mitco Open Steel Flooring. Mitco Shur-Site Treads and Mitco Armorgrids. Light and Heavy Steel Plate Construction.

GRUENDLER CRAFTSMANSHIP

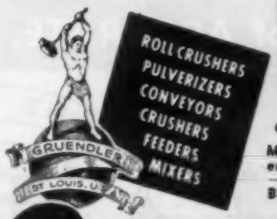
Serving Industry over 50 Years

Continuous Peak Production in Cement Plants

Depends Largely on Crushing Equipment

GRUENDLER CRUSHERS and PULVERIZERS

of heavy duty types with capacities to 300 tons per hour and larger—produce uniform fine product to increase capacities of Ball, Rod or Compeb Mills.



Cut-away View of Hammer Crusher

Mfrs. of Double Roll & Hammer Crushers for Primary & Secondary Crushing

BULLETIN on large capacity HAMMER-MILLS mailed on request

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2915-17 North Market St., ST. LOUIS (6), MO.

Senate Passes Post-War Highway Bill

BEFORE recessing the Senate passed and sent to the House of Representatives an amended version of its post-war highway bill (S. 2105), provisions of which have been outlined in ROCK PRODUCTS. It now remains for the House to pass the bill. Briefly, the bill authorizes the expenditure of $450,000,000 of Federal funds annually for each of the first three years following the war with $200,000,000 yearly for regular Federal-aid roads; $125,000,000 annually for urban highways and $125,000,000 annually for farm-to-market roads. The bill requires matching of 50 percent Federal funds with 50 percent State funds.

Buys Quarry

AUXVASSE QUARRY CO., Auxvasse, Mo., was sold to Samuel Kraus and Co., a large contracting company of St. Louis, Mo. The news report states that the company plans to install new equipment at the plant, including a crusher to pulverize limestone for agricultural purposes. Production in all sizes will be increased to over 200,000 tons annually. William Markwell, St. Louis, Mo., has been mentioned as the probable manager of the plant.

"PENNSYLVANIA"

STEELBUILT
SINGLE ROLLS

assure uninterrupted low cost primary crushing. Nine (9) sizes meet the requirements of large, medium and small Cement, Lime and Gypsum Plants.

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REVERSIBLE HAMMERMILLS

prepare these Primary products to specified sizes, with higher efficiency and lower operating costs than previously possible. Fifteen (15) sizes afford broad selection range.

Our Engineers are at your service for cooperative study and recommendations.

Liberty Trust Building, PENNSYLVANIA CRUSHER COMPANY Philadelphia 7, Pa.

Associated with Fraser & Chalmers Engineering Works, London.

STEELBUILT CRUSHERS

Construction Increase

NEW CONSTRUCTION activity in the United States in August amounted to $316,000,000, a 2 percent increase over the previous month's level of $310,000,000 but less than half the $638,000,000 volume of August, 1943, the War Production Board reported recently.

August activity brought the total volume put-in-place during the first eight months of 1944 to $2,540,000,000, or but 44 percent of the $5,793,000,000 activity registered during the corresponding period of last year. Overall activity is expected to decline slightly in September with sharper declines estimated for the last quarter of 1944, WPB officials said.

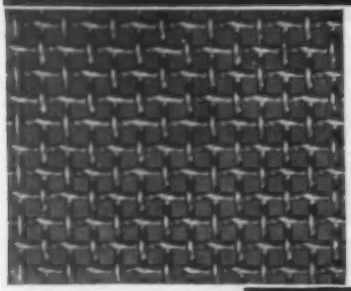
Construction work financed by private funds in August accounted for a $127,000,000 volume, or 40 percent of the total August activity. In August a year ago, private work totaled $143,000,000, which was but 22 percent of that month's total work.

Publicly-financed construction activity in August amounted to $189,000,000 or only 38 percent of the $495,000,000 publicly-financed construction activity during August a year ago. Construction of military establishments (camps, airfields and bases, storage facilities, etc.) amounted to $63,000,000 or 32 percent of the August, 1943, figure; over the same time period, construction of government-financed industrial plants, $41,000,000 or 32 percent; government financed housing, $14,000,000 or 24 percent; and all other public construction, $71,000,000 or 66 percent.

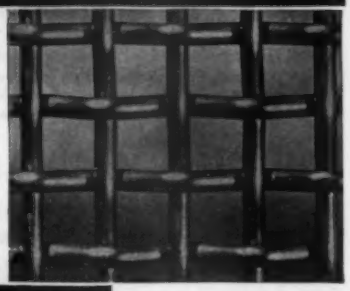
Cement for Big Tunnel

COLORADO PORTLAND CEMENT CO., Denver, Colo., has the contract to supply 110,000 bbls. of cement for lining the Adams tunnel of the Colorado-Big Thompson diversion project, which was holed through early in June. Work on the project has been delayed due to the lack of labor, but deliveries of cement started in September.

Trade Mark of ACCURATE, DEPENDABLE WIRE SCREENS

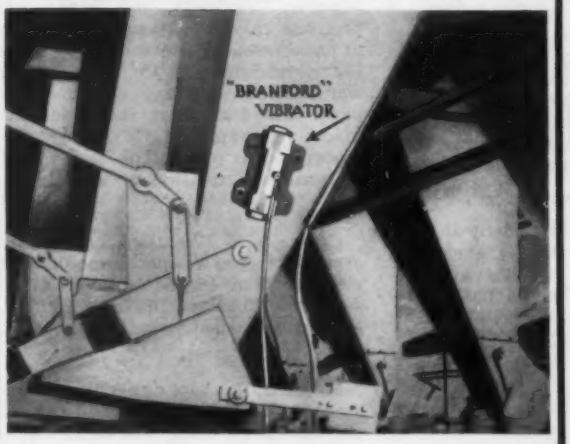


THE TYLER TRADE MARK REG. U. S. PAT. OFFICE DOUBLE CRIMPED



THE W. S. TYLER COMPANY, Cleveland 14, Ohio

"BRANFORD" PNEUMATIC VIBRATORS



★ "Branford" Vibrators afford an efficient means of keeping Material Handling Equipment functioning at full capacity. Built in sizes and types suitable for any size job.

★ Pay for themselves in a short time. Costly damage to equipment by sledging eliminated. Reduces time and labor expense to a minimum.

★ Check up today on your material handling problems.

Write for Our Bulletin "E"

Also "Branford" Vibrators for Concrete Placement.

NEW HAVEN VIBRATOR CO.

145 CHESTNUT ST. NEW HAVEN, CONN.

FASTEST POURING

Almost Any Job of Concrete Can be Done Faster with JAEGER TRUCK MIXERS

"HIGH DUMP"

Millions of yards of Jaeger Truck-Mixed Concrete on major war work (exceeding the output of all other makes combined) prove the advantages of these motorized concrete plants. Nimble, flexible and fast, they speed placement, solve problem of extended or continuous pours.

THE JAEGER MACHINE CO.,
603 Dublin Avenue
Columbus, Ohio

Mixers—Pumps—Hoists
Paving Equipment

or "LOW CHARGE" Type

WILFLEY
centrifugal SAND PUMPS

for Slurries, Sand Tailings Slimes, Acid Sludges

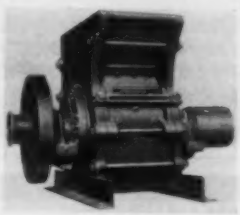
Save Pumping Cost

Continuous operation without attention for long periods. Stuffing box, stuffing, gland water ALL eliminated. Close clearances maintained by easy slippage seal adjustment. Heavy pumping parts of material best suited for YOUR particular problem. Complete engineering service. Prompt shipment of parts. The most efficient and economical pump you can buy. *Write for Complete Catalog.*

A. R. WILFLEY & SONS, Inc. Denver, Colo., U. S. A.
NEW YORK OFFICE: 1775 BROADWAY

Agricultural or Crushed LIMESTONE

AT LOW COST — WITH one MACHINE



GILSON
LIMESTONE PULVERIZERS

• Produce agricultural limestone or crushed limestone with equal ease with ONE MACHINE—The GILSON No. 22. It will handle up to 40 tons per hour, either pulverizing or crushing limestone. Adjustments are quickly made without removing any major parts. It will operate as a stationary or portable unit, thus reducing load handling costs by moving the unit to transient jobs. The GILSON No. 22, shown here, is a heavy-duty, large capacity machine. Requires only 125 H.P. to operate at full capacity. GILSON Pulverizers are built in five sizes ranging from 3 to 40 ton hourly capacity for every production purpose. Send for descriptive booklet, now.

"Always in the Limelight"

GILSON BROS. CO.
FOUNDRY & MACHINE WORKS • FREDONIA, WISCONSIN

HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

Construct Storage Tunnel

AMERICAN AGGREGATES CORP., Indianapolis, Ind., is constructing a concrete reclaiming conveyor tunnel for storage of finished materials. Storage capacity will be about 50,000 cu. yd. Plans indicate that it will be completed by next spring.

Block Contract

GRAYSTONE CONCRETE PRODUCTS CO., Seattle, Wash., has the contract to furnish concrete masonry units for the three-story addition to the Mount Vernon, Wash., frozen food plant of S. A. Moffett Co., Seattle, Wash.

OBITUARIES

GEORGE H. CHARLS, president, Metro Coal and Limestone, Inc., Canton, Ohio, died suddenly September 12 at his home. He was 66 years old. Mr. Charls was also executive director of the State Interorganization Conference at Columbus, director of the Metropolitan Paving Brick Co. and the Allied Corp.

•

EARL A. BURR, vice-president of the Cleveland Quarries Co., Cleveland, Ohio, passed away recently at the age of 66. Mr. Burr was a native of Grand Rapids, Mich., but at an early age came to Cleveland with his parents. After graduation from Central High School he attended Western Reserve University and began his business career as assistant auditor of the Cleveland Stone Co., later the Cleveland Quarries Co. In 1928 he was elected secretary of the company and ten years later he was made vice-president. Mr. Burr was recognized as one of the best-posted men in the dimension stone industry.

•

CLARENCE E. WILLIAMS, one of the organizers and former director and vice-president of the National Gypsum Co., Chicago, Ill., and Buffalo, N. Y., died recently at the age of 67.

•

MOSES T. EPLING, owner and manager of the Epling Sand and Gravel Co., Gallipolis, Ohio, died at his home August 28. He was 67 years of age. Though in recent years handicapped by almost total blindness, Mr. Epling courageously and capably carried on his business. Besides being in business for himself for 25 years, he had served as manager of the Western Rivers Co. and other similar concerns.

•

DAVID WAXMAN, manager of the asphalt sales department of the Shell Oil Co., New York, N. Y., and a director and former chairman of the executive committee of The Asphalt Institute, died on August 29 at the age of 46.

•

H. RAY ZULL, engineer and superintendent of the Wolverine Portland Cement Co., Coldwater, Mich., for 32 years, passed away September 3. He was 58 years of age. Mr. Zull was stricken while working in the garden of his summer home at Coldwater Lake. He was a native of Branch County, Mich., and had spent his entire life in and around Coldwater. Most of his business life was spent in various engineering capacities with the Wolverine company and in the fall of 1940 he was made superintendent of the Coldwater plant.

BROWNHOIST BUCKETS

Above you see a typical Brownhoist Bucket doing its share of speeding America's Industrial Production. Brownhoist buckets take deep, clean, bites. Extra large sheaves reduce rope wear and maintenance. Sturdy construction insures long life. For facts and prices about Brownhoist Rope-Reeve, Power-Wheel and Link-Type buckets write to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York City, Philadelphia, Pittsburgh, Cleveland and Chicago.

"WIRE SCREENS?
SURE BILL—BUY 'CLEVELAND'-WE DO!"

Tough, Durable, Accurate Wire Screens for Vibrators or Rotary Jackets

Cleveland is the "Buy" Word of Quality

THE CLEVELAND WIRE CLOTH & MFG. CO.

3574 E. 78TH STREET CLEVELAND, OHIO

New Incorporations

Wisconsin Valley Concrete Products Co., Wisconsin Rapids, Wis., has been incorporated to deal in concrete products with a capital of 250 shares of stock at $100 each. Incorporators are Ralph J. and Elinor Kutchera and Raymond J. Melville. Agent is Brazeau & Graves, Wisconsin Rapids.

American Cement Tile, 38 S. Dearborn St., Chicago, Ill., has been organized to manufacture, buy, sell and deal in precast or other cement roofing tiles. Authorized capital 100 shares common stock, par value $100. Incorporators are L. J. Wilhartz, C. S. Freund and S. E. Hirsch. Correspondents: Wilhartz & Hirsch, 1501 First National Bank Bldg., Chicago.

Wharton Slag Co., Morristown, N. J., has been incorporated with a capital of $50,000. Agent is Julius Kwalick.

Arkansas Agstone Co., Batesville, Ark., has filed articles of incorporation to engage in business of buying, selling and manufacturing limestone products, with an authorized capital stock of 100 shares at $100 each, beginning with 300 shares. Incorporators are Harvey G. Combs, Leffel Gentry and John F. Park, all of Little Rock, Ark.

Manufacturers' News

Sun Oil Co., Philadelphia, Penn., announces that Dr. Edgar S. Ross has completed his assignment as chief of the Lubricants Section, Aviation Division, Petroleum Administration for War, Washington, D. C., and has returned to the Sun Oil Co. where he will devote his full time to the development of technical sales with the industrial products department. His headquarters will be in Philadelphia, Penn.

The Kent Machine Co., Cuyahoga Falls, Ohio, manufacturers of concrete products machinery, announces the appointment of Harry J. Quirk as sales engineer. Mr. Quirk has had many years of mechanical experience and training in the concrete products industry. His early mechanical experience was gained as superintendent for The Cutting Armstrong and Tobin Company. Later he associated himself with The Chase Foundry and Mfg. Co., Columbus, Ohio, and then was with the Abram Cement Tool Co. and The Multiplex Concrete Machinery Co. in both sales and manufacturing divisions.

Harry J. Quirk

Oliver United Filters, Inc., New York, N. Y., announces that J. F. Mitchell-Roberts, manager of the foreign and export division, has resigned from the company and gone to Auburn, Calif.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has appointed Frank C. Angle, manager of sales activities in the Pacific Region, as manager of all field sales offices of the general machinery division and their operations. He will continue to supervise operations of the Pacific Region.

E. I. duPont de Nemours & Co., Wilmington, Del., announces that Wilbur A. Lazier has resigned as research group leader in the chemical department to become director of Southern Research Institute, which will establish laboratories at Birmingham, Ala.

Westinghouse Electric & Mfg. Co., Pittsburgh, Penn., has appointed J. H. Jewell as manager of the industry departments of the company.

PULVERIZERS for the reduction of Cement Materials, Limestone, **Agricultural Limestone,** Fire Clay and All Dry, Refractory Materials.

Capacities: 1 to 60 tons per hour **Finenesses: 20 to 350 mesh**

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.

To Increase Capacities or Fineness of Present Grinding Plant—
To Reduce Power and Maintenance Costs—
To Insure an Absolutely Uniform Product—

***Use the* BRADLEY AIR SEPARATOR**

MANGANESE STEEL CASTINGS

for
PULVERIZERS
CRUSHERS
ROLLS
SCREENS

for
SHOVELS
DREDGES
CRANES
CONVEYORS

The Frog, Switch & Mfg. Co.

Established 1881 CARLISLE, PA.

For Fast, Accurate, Continuous—

WEIGHING

FEEDING

PROPORTIONING

Raw Mix—Finish Grind

Use **FEEDOWEIGHT**

MERRICK SCALE MFG. CO. 188 AUTUMN STREET PASSAIC, NEW JERSEY

ERIE BUCKETS

THE COMPLETE LINE

Erie builds *all* types of buckets in various weights and capacities to meet the job and operating conditions. Choose the correct bucket for the job and you get the maximum speed and output. Write for broadside on the complete Erie line of buckets

ERIE STEEL CONSTRUCTION CO · ERIE, PA.

AggreMeters · Buckets · Concrete Plants · Traveling Cranes

SPECIFY MACWHYTE PREformed

...the Correct Rope for your equipment

made to meet the needs of

ROCK PRODUCTS OPERATORS

- PREformed
- Internally Lubricated
- Made from selected steels
- Made by craftsmen with years of experience

NO. 718

MACWHYTE COMPANY
2949 Fourteenth Ave., Kenosha, Wis.
MILL DEPOTS: New York, Pittsburgh, Chicago
Ft. Worth, Portland, Seattle, San Francisco
Distributors throughout the U. S. A.

American Chain Ladder Co., Inc., New York, N. Y., announces that Mark M. Gladstone has been appointed controller of the company, with headquarters in the New York office.

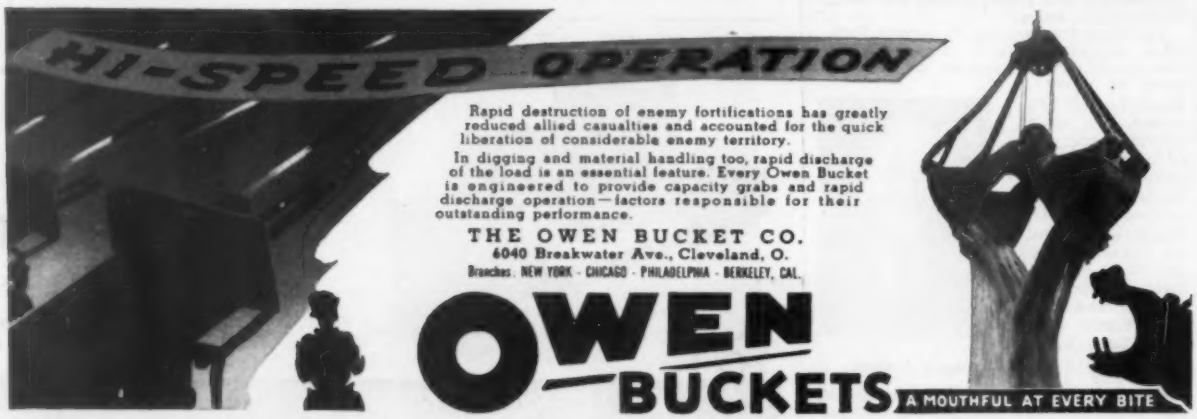
Robins Conveyors, Inc., Passaic, N. J., announces that William B. Mercer has returned to the Boston office from the War Production Board, Material Handling Division, where he was chief in charge of the conveyor and mechanical power transmission equipment section. He will again handle sales of Robins materials handling machinery, sharing the New England territory with J. F. Donahue who is in charge of Mead-Morrison Division sales.

Caterpillar Tractor Co., Peoria, Ill., announces that W. K. Cox has been advanced to the position of assistant general sales manager. William S. Ziegler, formerly assistant sales manager of the eastern sales division, has been made sales manager of that division, and F. D. Haberkorn, representing the company in Texas and Oklahoma, has been appointed assistant sales manager of the eastern division.

Mac Trucks, Inc., New York, N. Y., has appointed William M. Kauffmann assistant to the chief engineer, in charge of Diesel engine development. In his new capacity, Mr. Kauffmann will supervise Diesel research and development.

Pioneer Engineering Works, Minneapolis, Minn., announces that Orval "Bud" Ohnstad has returned to the company after a two year leave of absence as a quarry superintendent for Johnson, Drake & Piper Co. His first assignment was Eritrea in East Africa where he set up and operated a large Pioneer quarry plant. A year later he returned to New York and was hired by the McWilliams Dredging Co. and sent to Greenland to set up and operate two more Pioneer crushing plants.

PERFORATED
METAL SCREENS
ANY SIZE—ANY SHAPE—ANY METAL—ANY PERFORATION
Perforations are properly spaced to give maximum screening efficiency and strength.
Send for catalog showing wide variety of perforations, metals, etc.
The Harrington & King PERFORATING CO.
5650 FILLMORE ST., CHICAGO 44, ILL.
114 LIBERTY ST., NEW YORK 6, N. Y.


HI-SPEED OPERATION
Rapid destruction of enemy fortifications has greatly reduced allied casualties and accounted for the quick liberation of considerable enemy territory.
In digging and material handling too, rapid discharge of the load is an essential feature. Every Owen Bucket is engineered to provide capacity grabs and rapid discharge operation—factors responsible for their outstanding performance.
THE OWEN BUCKET CO.
6040 Breakwater Ave., Cleveland, O.
Branches: NEW YORK - CHICAGO - PHILADELPHIA - BERKELEY, CAL.
OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

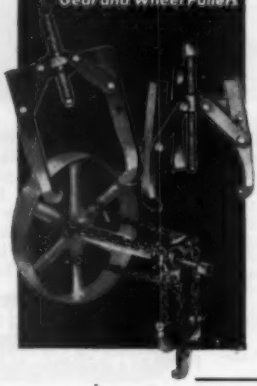
DIAMOND BALANCED VIBRATORS

DIAMOND

Violent vibration for fast, positive separation *all over* the screen—controlled by accurately balanced design for smooth action. Long life, low maintenance costs. No choke. Fast delivery. 11 Sizes in 1-2-2½-3-4 Decks. Tell us your needs. Write for Bulletin D42V.

DIAMOND IRON WORKS, INC.
AND THE MAHR MANUFACTURING CO. DIVISION
1000 NORTH SECOND ST., MINNEAPOLIS 11, MINNESOTA

ARMSTRONG-BRAY
Gear and Wheel Pullers



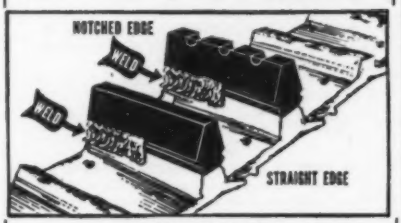
Prompt Shipments from Stock

STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not slip from work. Arms are forged and heat-treated. 2-arm, 3-arm and special models. 12 types and sizes. CHAINGRIP Universal Pullers pull wheels, solid gears, pinions, etc., even at considerable distance from end of shaft. Proof-tested chains have both chain hooks and special pulley hooks. 3-ton and 12-ton capacities.

Write for Catalog Sheets

Armstrong-Bray & Co.
"The Belt Lacing People"
5386 Northwest Highway, Chicago 30, U.S.A.

Rebuild your
TRACTOR GROUSERS
WITH BULLDOG
Grip-Lugs



Easily Welded

OTHER PRODUCTS
Trak-Link Re-Nu Plates
Mango Bars for Repointing
Digger Teeth
Excelloy Overlay Metal

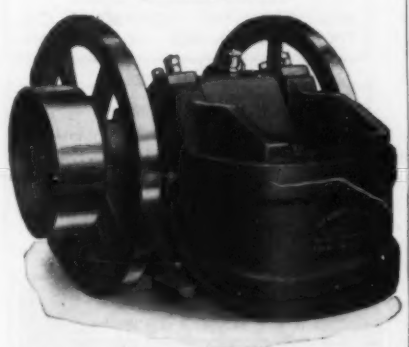
Send for Folder RP-6

Allied Steel Products, Inc.
N. B. C. Bldg.
CLEVELAND 14, OHIO

FARREL
BACON
CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service



EARLE C. BACON, Inc.
17 John St., New York, N. Y.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has launched a new post graduate educational course, in cooperation with the Illinois Institute of Technology, which will lead to a Master of Science degree in electrical or mechanical engineering after the completion of 32 hours of the approved curriculum, with a grade of "B" or better, and the writing of a satisfactory thesis. The graduate course of instruction, conducted after working hours for the Allis-Chalmers employes, will be taught at the West Allis plant by professors of the Illinois Institute of Technology.

The National Supply Co., Toledo, Ohio, announces that the Superior engine division of the company has opened a new sales office at Ames, Iowa, with Charles B. Sherman as district manager. Mr. Sherman received his education in mechanical engineering at Iowa State College, and was for many years engaged as a contractor in building municipal power plants and waterworks systems. Following this, he became Western district manager for the H. Channon Co., Chicago, Ill. For the next ten years, he was head of the Iowa State sales office of Electric Machinery Mfg. Co., Minneapolis, Minn. Since 1941, Mr. Sherman has been chief expediter for the Busch-Sulzer Bros. Diesel Engine Co., St. Louis, Mo. The new district offices will be located at 315 Main St., P. O. Box 324, Ames, Iowa.

Chas. B. Sherman

The Foxboro Co., Foxboro, Mass., makers of industrial instruments for measurement and control, announces that Walter H. Ridley has joined the sales promotion department at Foxboro.

Wickwire Spencer Steel Co., Buffalo, N. Y., has made three important changes in its plant operating personnel. M. G. Werme, formerly superintendent at the Clinton, Mass., plant, has been appointed chief development engineer. Gordon Lloyd has been made superintendent at the Clinton plant, and Victor Chartner has been named chief mechanical engineer.

Fairbanks, Morse & Co., Chicago, Ill., has purchased the Pomona Pump Company, a division of Joshua Hendy Iron Works in a $4,000,000 transaction. No changes in personnel are contemplated. Arnold G. Brown, general sales manager of the Pomona company, becomes assistant manager of the Fairbanks-Morse Pump Division in charge of Pomona and Westco products. Distribution and sales will continue under Mr. Brown's direction.

Lima Locomotive Works, Shovel and Crane Division, Lima, Ohio, announces the appointment of Rupp Equipment Co., 101 Great Arrow Ave., Buffalo, N. Y., as an authorized distributor for Lima shovels, cranes and draglines in western New York.

Diamond Iron Works, Inc., Minneapolis, Minn., manufacturers of crushing, screening, conveying and other construction equipment, has announced that J. P. Blackman, with headquarters at 44 Walnut St., Medford 55, Mass., has been appointed factory representative for Pennsylvania, New Jersey, the New England States, and the eastern provinces of Canada, and that Equipment Rental & Sales, Inc., Menands, Albany, N. Y., and Contractors' Syracuse Sales Co., Inc., 1212 Wolf St., Syracuse, N. Y., have become Diamond distributors in their respective territories.

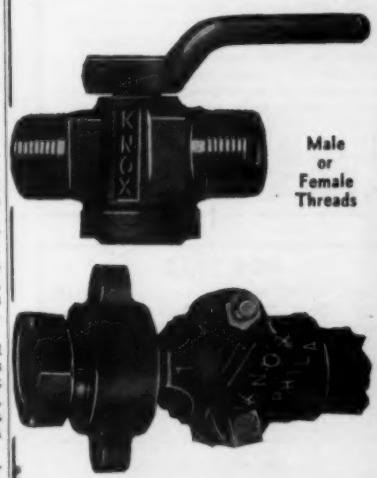
The Foxboro Co., Foxboro, Mass., has announced the addition of Paul Torre to the staff of sales engineers covering the New England territory, with headquarters at the New England District Office, Foxboro, Mass.

Made of
Acid Open Hearth
Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

The Service Record of this wire rope continues to make and hold friends.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
Established 1857
5909 Kennerly Avenue St. Louis, Mo.
New York — Chicago — Denver
San Francisco — Portland — Seattle



Male
or
Female
Threads

Recognized Universally as the ULTIMATE in Valves and Couplings

KNOX MANUFACTURING CO.
818 CHERRY ST., PHILA. 7, PA.
Since 1911 Producers of

KNOX
Valves-Couplings-Nipples-Clamps-Menders

Classified Advertisements

POSITIONS WANTED — POSITIONS VACANT Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION—Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $5.00. Unless on contract basis, advertisements must be paid in advance of insertion.

FOR SALE

FOR IMMEDIATE SHIPMENT

RAYMOND PULVERIZERS

2—4 roll HIGH SIDE MILLS COMPLETE, FOR EXTREMELY FINE PRODUCTS.
1—4 roll HIGH SIDE MILL, EQUIPPED WITH WHIZZER SEPARATOR AND LATEST OIL TYPE JOURNALS.

BELT CONVEYORS

1—30"x640' c/c, complete, ball bearing idlers, gear reducer, 30 HP. motor, etc.
1—30"x120' Rex-Stearns, ball bearing idlers, complete but without belt.

OLIVER CONTINUOUS FILTERS

1—8'x8' rebuilt, with new wood staves, wood grids and new internal piping.
2—8'x10' with wood staves, steel trough.
2—8'x12' all steel, complete with pumps and receivers.

SYMONS CONE CRUSHER

1—3 ft. with coarse bowl, spare parts.

HARDINGE CONICAL BALL AND PEBBLE MILLS

1—5'x22", iron lined, silent chain drive.
1—6'x36", silex lined, silent chain drive and motor.
2—8'x30", silex lined, belt driven.

CRUSHING ROLLS

1—24"x40" Pennsylvania Single Roll Crusher, flat belt drive.
2—40" dia. x 16" Colorado Iron Works, smooth rolls, equipped with fleeting device.

DORR CLASSIFIERS AND THICKENERS

3—Dorr Combination Bowl and Rake Classifiers;
10' dia. with 2'3"x19'8" rake.
12' dia. with 2'3"x21'4" rake.
15' dia. with 2'3"x23' rake.
3—Dorr Thickener Mechanisms, for 20' dia. x 10', 30x12', 40x12'.

DIRECT HEAT ROTARY DRYERS

2—4'x30' Ruggles-Coles single shell. Can also be used as Rotary Kilns.
2—5'x40'.
1—6'x24' Cummer, mounted on steel I-beam frame, with furnace, etc.
2—6'x30' Ruggles-Coles, double shell.

FOR 25 YEARS A SYMBOL OF CONFIDENCE

CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 PARK ROW — NEW YORK, N. Y.
Shops and Yard at Newark, N. J., cover eight acres.

Plymouth and Milwaukee gas locomotives, 8, 12, 25, 35 tons, 36" and std. ga., A-1.
Davenport, Porter, Vulcan 18 to 20-ton steam 36" gauge S/T locomotives, (4), rebuilt.
American 85-ton steam locomotives, 0-6-0, (3).
Vulcan 18-ton steam S/T locomotive, 42" ga.
Bucyrus 50B and 80B steam shovels.
Pioneer 300W portable gravel washing plant.
Gyratory crushers, 12", 21", 27"; 7" Newhouse.
Page Diesel 2-yd. Walking dragline, 65' boom.
Euclid 6-yd. bottom dump crawler wagons, (8).
Sturtevant No. 2 rotary fine crusher.
Telsmith No. 540 rotary grizzly-plate feeder.
Toepfer revolving gravel screen, 48"x18'.
Monighan 3-yd. electric Walking dragline.
P&H ⅝-yd. gas shovel, Model 204, 19' boom.
Boiler tubes, 236—1¾"x5', ferrules, new.

H. Y. SMITH CO.
828 N. Broadway — Milwaukee 2, Wis.

FOR SALE

Besser Champion Block Machine with attachments for 3", 4", 6" and 8"x18". 5 HP. Motor, V belt drive, new 1939. Makes 3", 4", and 6" two at a time. Also about 1450 Plain pallets 12¼x18¼x ¼. Immediate delivery. Price for quick sale, complete with pallets, $1500.00 F.O.B. our plant.

BEDFORD HILLS CONCRETE PRODUCTS CORPORATION
Bedford Hills, New York

FOR SALE — REDUCTION CRUSHER

30-inch Stedman Impact Type. Like new with extra breaker plates. Immediate delivery.

COOLEY GRAVEL COMPANY
Chillicothe, Mo.

FOR SALE

15 ton, 22'x9' scale.....$440.00
Single Deck, 3'x6' vibrating screen 495.00

BONDED SCALE COMPANY
128 Bellview — Columbus 7, Ohio
Mfrs. of Scales, Vibrating Screens and Crushers

FOR SALE

1½ yd. Jaeger Truck Mixer Unmounted.

RIVER SHIPPING & SUPPLY CORP.
Box 760 — West Elizabeth, Pa.

FOR SALE

1—3 ft. x 10 ft. Type 38 Tandem Tyler Hammer No. 7839, equipped with V-16 Vibrators.
1—C-15 Power Unit, 220 Volts, 60 Cycle, Single Phase.
2—Type B-2 Bucyrus-Erie ¾ yd. Rock Dipper Cast Front, inserted teeth.

ROCKFORD STONE COMPANY
Rockford, Ohio

60-TON LOCOMOTIVE

Storage Battery Type, built by General Electric Co. in 1930. Double truck, 4-motor type, each 75 HP. Steeple cab. Good condition.
Complete specifications available.

IRON & STEEL PRODUCTS, INC.
13492 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

GOOD VALUES—ALWAYS

24x18" American Hammermill.
35 ton WLG Plymouth Gas Locomotive.
75 HP. to 500 HP. Diesel Units.
Caterpillar Diesel tractor and Bulldozer—70 HP.
80 and 150 HP. Vertican and HRT Boilers.
35 HP. Clyde 2 and Swinger Gas Hoist.
1¼ yd. P&H 600-A Gas Dragline and Crane.

MISSISSIPPI VALLEY EQUIPMENT CO.
515 Locust Street — St. Louis 1, Mo.

---

4 Jeffrey-Traylor No. 4 Vibrating Pan Feeders, two never used, two only slightly.
36" Traylor TZ Gyratory Crusher, belt drive.
24"x36" Traylor Deep Frame Jaw Crusher.
No. 2 Williams Jumbo Jr. Pulverizer, rebuilt.
20"x24" Greenville Double Roll Crusher.
Universal 40"x20" Double Roll Crusher.
21"x42" McLanahan Single Roll Crusher.

MID-CONTINENT EQUIPMENT CO.
710 Eastgate — Pa 2290 — St. Louis 5, Mo.

FOR SALE

One Pioneer Screening and Crushing Plant; 9 by 36 inch crusher, on iron wheels.

G. F. HOLMBERG
Gladstone, Michigan

FOR SALE

1550 ft. of 2" 6x19 Plow Steel, Langs Lay, Hemp Center, Trade 2245-2246, covered with LePro. One end having a standard Bridge Socket attached, with bolt holes spaced 10⅛" on centers. Other end having attached Special Heavy Bridge Socket with bolt holes spaced 1' 1x⅛" on centers. Rope wound on reel having special heavy socket on outside of reel.

QUOTATION UPON REQUEST
EAGLE ROCK LIME CO., EAGLE ROCK, VA.

FOR SALE

1—21"x42" Single Roll McLanahan Crusher. Good shape. Extra set of fine segments. 15 V-belts.
1—PA 50 International Power Unit. Like new.
1—7"x12" Universal Crusher. New pitman, shaft and bearings.

Write Box B-77, c/o Rock Products, 309 W. Jackson Blvd., Chicago 6, Illinois

---

FOR SALE

One 8-inch heavy duty Butler, Tell-Tale Sand and Gravel Pump. Extra shafts, impellers and liners. $500.00 cash. Write Box B-94, c/o Rock Products, 309 W. Jackson Blvd., Chicago, Ill.

DIESELS

ROBERT SCHOONMAKER
Port Washington, Long Island, N.Y.
Phone Roslyn 1220

FOR SALE

Austin Gyratory Crusher No. 107.

Buchanan Crusher, 12" x 36" Type B Jaw Crusher.

Allis-Chalmers Double Roll Crusher, Garfield Type, Size 54" x 20", with new Manganese Roll Shells.

Lippman Scrubber Screen, 72" x 18', complete with G.E. 20 HP Motor, 440 volt, with starter.

Tyler Type 31 Tandem Hummer Screen, 8' x 5', 3 surface with G.E. Type G2 Motor Generator Set.

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Address inquiries to:

AMERICAN ZINC COMPANY OF TENNESSEE

Paul Brown Building, St. Louis 1, Missouri

LOCOMOTIVES SHOVELS — CRANES CARS

1—65 ton American 0-6-0 standard gauge separate tender switcher, 20x26" cylinders, ASME boiler. ICC papers.

1—50 ton Porter 0-4-0 standard gauge saddle tank switcher, National Board and Ohio standard boiler. Built 1928.

1—33 ton Vulcan 0-4-0 standard gauge saddle tank switcher, ASME boiler.

1—72½ ton Baldwin 0-6-0 standard gauge separate tender switcher, 20x26" cylinders. Full time ICC papers.
The above locomotives are now being rebuilt for prompt delivery.

1—40 ft. steel underframe flat car, 50 ton.

1—60 ft. steel underframe flat car, 40 ton.

1—2 yard Hayward rehandling 2 line clamshell bucket, completely overhauled.

Birmingham Rail & Locomotive Co.

BIRMINGHAM 1, ALABAMA

CRUSHERS—ELEVATORS—SCREENS CONVEYORS

1—RELIANCE 8"x14" Portable Jaw Crusher
1—NEW 9"x15" BEAUMONT Jaw Crusher
2—Used 9"x15" CHAMPION Jaw Crushers
1—10"x20" CHAMPION Jaw Crusher
1—12"x20" BUCHANAN Jaw Crusher
3—12"x26" CHAMPION Jaw Crushers
1—No. 1030 CHAMPION Roller Bearing Crusher
1—4½" TRAYLOR Gyratory Crusher
1—No. 2F TELSMITH Gyratory Crusher
2—NEW Small Hammer Mills

JOHNSON & HOEHLER, INC.
Lansdowne, Penna.

New—RAILS—Relaying

ALL SECTIONS

Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos, frogs and switches. Attractive prices quoted. Wire, write or telephone for quotations.

M. K. FRANK
Park Bldg. Pittsburgh, Pennsylvania
480 Lexington Ave. New York, N. Y.
Blitz Bldg. Reno, Nevada
Havana, Cuba

FOR IMMEDIATE DELIVERY OF RUBBER PRODUCTS

Conveyor Belting...Transmission Belting...Elevator Belting...Fire, Water, Air, Steam, Suction or Welding Hose, etc.

CALL, WIRE or WRITE
CARLYLE
THE RUBBER HEADQUARTERS

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT
FIRE HOSE

APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY

RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached

I.D. Size	Length	Per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.

62-66 PARK PLACE — NEW YORK, N. Y.

RELAYING RAILS

Angle Bars — Tie Plates
All Track Accessories

Midwest Steel Corporation
Charleston, W. Va.

RAILS NEW AND RELAYING

TRACK ACCESSORIES
from 5 Warehouses
L. B. FOSTER COMPANY
PITTSBURGH • CHICAGO • NEW YORK

4 OFFICES and PLANTS

CHICAGO 1155 S. Washtenaw Ave.	NEW YORK 30 Church St., Dept. ENR
PITTSBURGH P. O. Box #933, Dept. ENR	PHILADELPHIA 1503 Race St.

EQUIPMENT CORPORATION of AMERICA

WE SERVE 4 WAYS

BUY — REBUILD
SELL — RENT

4

SHOVELS DRAGLINES

REASONABLY PRICED

1—½ yd. Bucyrus-Erie 10/20 shovel and crane combination, rebuilt—$7,100.00.

1—1939—½ yd. Lorain shovel, backhoe and crane combination, rebuilt—price upon request.

1—⅝ yd. Bay City "Pup" shovel—$1,950.00.

1—Bay City Model 20—½ yd. backhoe and ⅜ yd. shovel—rebuilt and guaranteed.

1—⅝ yd. Byers 1939 crane, backhoe and shovel with dragline and clamshell bucket; rebuilt and guaranteed—$9,950.00.

1—½ yd General shovel and dragline combination—$4,900.00.

1—⅝ yd. Insley full revolving shovel, backhoe and dragline—$5,600.00.

1—Northwest Model No. 2 shovel—½ yd.—rebuilt and guaranteed—$6,100.00.

1—¾ yd. Lorain Model 45 shovel and dragline combination; excellent condition—$6,700.00

1—¾ yd. 1939 Marion backhoe and shovel combination, rebuilt—price upon request.

1—¾ yd. 1940 Bay City Model 45 shovel and crane combination.

1—¾ yd. P&H 204 dragline with dragline bucket—$2,900.00.

1—Koehring ¾ yd. dragline with 75′ boom—$4,900.00.

1—¾ yd. Northwest No. 3 shovel and backhoe combination; entirely rebuilt and guaranteed—$7,900.00.

1—¾ yd. 1942 Linkbelt dragline with 1 yd. dragline bucket, Diesel powered—excellent condition.

1—1 yd. Model 401 Koehring shovel and crane combination—$8,900.00.

1—1 yd. Koehring Model 301 shovel and crane combination; 1 yd. bucket and 45′ boom—$5,900.00

1—Northwest Model 5—1¼ yd. rebuilt and guaranteed—$8,300.00.

1—1½ yd. 1942 Bucyrus-Erie 37-B diesel shovel and dragline combination—$19,800.00.

1—1½ yd. 1939 Bucyrus-Erie 37-B shovel and dragline, rebuilt—$16,700.00.

1—1½ yd. Lorain 75-B crane, 75′ boom, rebuilt—$10,400.00.

1—1¾ yd. Bucyrus-Erie 43-B diesel shovel and dragline combination—$16,500.00.

1—1¾ yd. Northwest Model 7 dragline, 65′ boom—$12,900.00.

1—3 yd. P&H Model 900 dragline, 110′ boom, diesel powered—rebuilt condition.

For further information and listings of other shovels, cranes and draglines, please write, wire or telephone at once.

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49 Vanderbilt Avenue

New York 17, New York

Telephones Murray 4-2294-2295-2296

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CRUSHERS

GYRATORY: 42″ Gates K. 30″ Superior McCully (Like new). 20″ Superior McCully Gates Nos. 12, 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x34. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 15x36.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36″ TZ, 8″, 10″, 12″. Super. McCully 6″x10″. Newhouse 5, 7, & 10″. Symons Cone & Disc Ty. 2′ to 4′.

ROLLS: Allis-C. 12½x12, 36x10, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16. Etc.

HAMMERMILLS: Williams No. 1, 2, 3, 4, 8, & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40. Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6′x3′, 8′x30″ & 6′x9′. Misc. Tube Mills 5′ & 6′x22′. Sturtevant Ring Roll, Raymonds, Kents, Fuller Lehigh. Etc.

CRUSHING PLANTS: No. 65 Diamond No. 22 Pioneer 8x24. 10x30 Good Roads. 9x40 Austin-Western. 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kilns, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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4 new 115 h.p. Red Seal Continentals.

2 new 90 h.p. Red Seal Continentals.

1 new 45 h.p. 6-cylinder Continental.

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1 used, overhauled 90 h.p. Buda.

2 used 90 h.p. Budas with new blocks, pistons, rings, and bearings.

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1 used 125 h.p. Buda, nine months old.

1 Buda diesel about 90 h.p.

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Oelwein — **Iowa**

Dept. "R"

1½ yd. Osgood Diesel Dragline, 60′ Boom.

1¼ yd. Byers Gas Shovel.

1 yd. B.-Erie Gas-Air Shovel.

⅝ yd. Byers Gas Shovel-Crane-Pull-shovel.

1 yd. Link-Belt K-30 Gas Shovel.

14 ton Whitcomb Loco-Gas-36 Ga.

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5—Electric Hoists, 40, 50 and 60 HP.

1 yd. Round Shaft Buckets.

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2—Shovel Attach. Byers Bearcat Jr. Shovel Attachment for 41-B Bucyrus-Erie.

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AIR COMPRESSORS

BELTED: 315, 522, 676, 1000, 1200 & 1570 Ft.
ELECTRIC: 473, 676, 807, 1202, 1723 & 2360 Ft.
DIESEL: 603, 807 & 1000 Ft.
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Owen B A & B Stone Grapples.
2 Yd. OWEN Type S Material Handling.
1¼ Yd., 1 Yd. & ¾ Yd. HAYWARD Class B.
18 Steel Skips 6½ x 6 x 2½.
5 Ton Bucyrus Rock Grabs.

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25 Ton BROWNING & 30 Ton AMERICAN Loco.
25 Ton LINK BELT K-43 Electric, 70 Ft. Boom.

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¾ Yd. Lima Diesel.
2 Yd. Marion Steam Shovel.
¾ Yd., 1¼ Yd., 2 Yd. & 4 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas.
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15—2 Yd., 3 Yd., 4 Yd., 6 Yd., 12 Yd., 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.
15—Std. Ga. 50 Ton Battleship Gondolas.

FLAT CARS

9—50 ton std. ga. heavy duty flat cars.

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Gas: 15, 30, 60, 100 & 120 HP.
Electric: 30, 52, 80, 100 & 150 HP.
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75, 90, 180, 200 HP. F. M. Engines.
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4x16, 5x18 & 5x22 Tube Mills & 6′x22′.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 6x12 & 5x13 ROD MILLS.

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JEFFERY, 24x20 & No. 1 Sturtevant Ring Roll.
RAYMOND Auto Pulverizer No. 0000, 0 & 3.

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10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.

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8, 10 and 14 ft. Separators, Gayco & Bradley.

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36x66 Fairmount & 36x20 Diamond.

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10x8, 13x7¼, 14x7, 15x9, 15x10, 16x9, 16x13, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12, 30x15, 30x13, 36x15, 36x30, 36x18, 36x14, 36x9, 36x6, 36x10, 36x24, 42x9, 48x34, 48x36, 60x42, 84x66, 36x16, 9x36.

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5 No. 19, 25, 37 & 49 Kennedy.
18 In., 24 In., 30 In., 36 In. & 48 In. Symons Disc.
4—10 TZ Traylor & 4 Ft. Gyratory.
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BELT: 1000 Ft.60 In., 700 Ft.40 In., 600 Ft.36 In., 800 Ft.30 In., 1642 Ft.24 In., 517 Ft.20 In., 227 Ft.18 In., 500 Ft.16 In., 300 Ft.14 In.
IDLERS: 54 In., 42 In., 36 In., 30 In., 24 In., 20 In., 18 In., 16 In. & 14 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft.24 In.,30 In.&36In.Sections.

ROTARY DRYERS AND KILNS

36 In.x20 Ft., 3 Ft.x30 Ft., 4 Ft.x30 Ft., 54 In. x30 Ft., 42 In.x34 Ft., 5 Ft.x30 Ft., 5 Ft.x16 Ft., 5 Ft.x60 Ft., 6 Ft.x60 Ft., 6 Ft.x20 Ft., 6 Ft.x70 Ft., 10x20, 7½x100&8x110 Ft. Kilns.

STEEL DERRICKS

GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom,25 Ton 100 Ft.Boom,75 Ton 135 Ft.Boom.

LOCOMOTIVES

GASOLINE: 3 Ton,5 Ton, 8 Ton,12,14, and 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton.
DIESEL: 4, 8 & 15 Ton.

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HUMMER ROTEX, NIAGARA & ROBINS.
REVOLVING: 3x13, 3x16, 3½x18, 3x24, 4x16, 4x20, 4x22, 4x24, 5x30, 5x20, 6x30.

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1—3′-0″ x 30′-0″ Christie Dryer.
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Also small size dryers.

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Upon the completion, about Nov. 1, 1944, of the installation of a large air compressor at our Wilson Quarry located on the Norfolk Southern Railway near Bailey, N. C., we will have available for sale the following four compressors now in use there, complete with filters, belts, motors, starting equipment and controls. The compressors are of Ingersoll-Rand manufacture: all with short flat belt drives with idlers, and driven by 2200 volt, 3 phase, 60 cycle Allis-Chalmers motors. Air filters are Coppus make.

Item No.	1.	2.	3.	4.
Type	XCB	XB-2	ER-1	ER-1
Size	15" & 9¼" x 12"	16" & 10" x 14"	14" x 12"	12" x 10"
Serial No.	60300/1 PP	18180/1 PP	48137	55353
Design Data:				
R. P. M.	250	185	220	250
Piston Displacement	610	599	464	348
Discharge Pressure	100	100	100	100
Actual Delivery	518	515	308	231
Brake H. P.	105	104	74	57
Motor:				
Type	Slip-Ring	ARY	ARY	Bullock
H. P.	100	100	75	75
Rated Speed	700	865	870	870
Serial No.	117446	31836K-Y226D-1-1	Y426D-926-8753-2	2K7747.1
Size of Air Filter	FC-6	FC-6	FC-6	FC-4

The offer of these four compressors is conditioned upon the placing in operation of a large compressor which has been purchased to replace them and which is now being erected. The offer is subject to prior sale. The equipment can be inspected in operation any time during business hours.

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Marion No. 7 Gas-Electric Crane with magnet.
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Link-Belt Model K2 Crane.
General ½ yd. Diesel Crane.
Northwest No. 6 Shovel-Crane-Dragline.
Northwest No. 3 Crane, Shovel and Backhoe.
P & H 600 Shovel, gas.
Universal 7½ ton Truck Crane, pneus.
P & H 203A, 8 ton Truck Crane.
Browning 10-13 ton Truck Crane.
Buc. Erie 43B gas Dragline, rebuilt.
Buc. Erie 20B, 1 yd. Electric Tunnel Shovel.
Buc. Erie GA2 Shovel, gas.
Marion 37, 1¾ yd. Steam Shovel.
Page Walker 2 yd. Dragline, Diesel.
Lorain 75B, 1½ yd. Crane.
Lorain Model 45 Shovel-Crane.
Koehring 301, ¾ yd. Crane and Shovel.
Byers Bear Cat ½ revolving Crane, 5 tons cap.

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Int. T35 Tractor with bulldozer.
Int. TD14 Tractor with bulldozer, rebuilt.
Allis-Chalmers L Tractor with Baker bulldozer.
Allis-Chalmers K Tractor with bulldozer.
Allis-Chalmers HD10 Tractor with bulldozer.
Bucket Elevator, vertical, 35', 22" buckets.
B.S. 12 ton, 3 wheel Roller, gas.
B.S. 10 ton, 3 wheel Roller, steam.
Galion 10 ton, 3 wheel Roller.
I.R. two stage, 315 CFM, Portable Compressor.
6—I.R. Wagon Drills.
4—Gardner-Denver Wagon Drills.
6—Srencer Dust Collectors, equal to new.
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Johnson 200 yd. Octo Bin, 4 compt.
Blaw-Knox Ready-Mix Plant, 100 ton Aggregate Bin and 300 bbl. Bulk Cement Bin.
Blaw-Knox 600 bbl. Bulk Cement Bin.
Fuller Kinyon Bulk Cement Unloader, portable.
Fuller C40 Rotary Air Compressor, electric.
Koehring 34E Dual Drum Paver.
Pavers: 2—Koehring, 1—Multifoote, 1—Rex 27E.
Rex Pumperete—Models 180, 190, 200.
Flex-plane Finisher, 10'-15' up to 32'.

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Roll: 54x24, 54x20, 48x36, 30x24.
Telsmith 20-B steel frame Gyratory; V-belt drive.
Gyratory Crusher: K.V.S. 36, 37-S, 49; 32, 8A, 8B; Traylor 8"; McCully 13", 8", 6".
Allis-Chalmers Anaconda Type, 54"x24".
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Complete Rock Crushing, Sand and Gravel Plants.

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Blaw-Knox ¾ yd. Clam. digging.
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American 45-ton, steam, Saddle Tank.
Plymouth 36-ton, gas, std. gauge.
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Vulcan 6-ton, gas, 36" gauge.
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5—5'6 x 5' x 60'
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3—Gates No. 6
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1—13000 GPM, 170' head, Turbine driven
1—5000 GPM, 148' head, Motor driven
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50 Pumps, all sizes, motor and turbine driven

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1000—230 volt DC and 220, 440 and 2300 volt, 3 ph, 60 cyc. From 1—500 HP

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1—18 Ton O&S type B Crane, mtd. on 8'-0" ga. track. 50' boom. Power 52 H.P. 440/60/3 elect. motor.

AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,600 cu. ft.

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1—1¼ yd. Erie gas air Model GA2, Serial No. 9758, with 45' boom and shovel attachment.

1—1 yd. Mdl. 600 P. & H., Serial No. 3502, 40' boom and backhoe attachment.

1—1 yd. Marion, Mdl. 440, Serial No. 5961, 50' boom.

1—¾ yd. Couco crane, Serial No. 1304, fully revolving, power 70 HP. Continental gas engine, 30' boom.

1—¾ yd. Koehring crane, Model 301, with 45' boom, Serial No. 722. Gasoline powered.

1—¾ yd. P. & H. Model 400 crawler crane, Serial No. 4136, with 40' boom, gasoline powered.

1—½ yd. P. & H. shovel, Model No. 204, Serial No. 2305, gasoline powered.

1—¾ yd. Erie Model B2 crawler crane, steam powered, Serial No. 4027, with 50' boom and shovel attachment.

CONVEYORS

1—100' stationary troughing type belt conveyor, 16" wide.

1—30' Link-Belt troughing type portable, 18" wide.

1—25' Northern troughing type portable, 18" wide. With elect. or gas power.

CRUSHERS

1—9x12" Rogers jaw crusher (Like New).
1—No. 4 Champion jaw crusher, size 9x15", Serial No. 2806.
1—No. 2 Climax jaw crusher, size 9x16".
1—Buchanan jaw crusher, size 10x16".
1—Acme jaw crusher, Ser. No. 1873, size 12x20".
1—Acme jaw crusher, Ser. No. 1686, size 9x16".
1—United Iron Works, "Blake-type" jaw crusher, size 9½x24".
1—9x12" Rogers jaw crusher, No. 314. LIKE NEW.
1—10x12" Colorado Iron Works roll crusher. Laboratory type.
1—Allis-Chalmers, No. 5 gyratory crusher, Ser. No. 5331, opening 10x38".
1—Austin No. 5 gyratory crusher, Ser. No. 2945, opening 12x35½".

DERRICKS

3—Steel Guy Derricks: 1—20-ton American, steel derrick, 110' mast, 100' boom; 1—5-ton Terry Guy Derrick, 70' mast, 60' boom; 1—5-ton Insley, 75' mast, 60' boom. Stiff leg derricks: 1—25-ton Hunter, 10' mast, 80' boom; 1—2-ton Pittsburgh, 26' boom, 15' mast. Also a number of wood stiff leg derricks, to 5-ton cap.

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85—Electric, ranging from 20 HP. up to 125 HP., consisting of triple-drum, double-drum and single-drum, with AC or DC motors, some with attached swingers. Following makes: American, Clyde, Lambert, Lidgerwood and National.

Gas hoists ranging from 8 to 120 HP., single, double and triple-drums; all standard makes (38 in stock).

Steam, ranging from 8 HP. to 60 HP., single, double and triple-drum; all standard makes.

LOCOMOTIVE CRANES

4—25-ton Loco. Cranes, Browning and Industrial oil fired, 40', 45' and 50' booms.

1—15-ton Bucyrus Erie, coal fired, 40' boom.

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Acme 6"x21" Type C jaw crusher, roller bearings.
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Buchanan 10"x16" Blake type jaw crusher.
N.E. 11"x20" jaw crusher, cast steel frame.
Champion 12"x24" jaw crusher, steel plate frame.
Scholl 9"x16" jaw crusher.
Reliance 8"x14" jaw crusher, cast steel frame.
Gruendler 6"x8" jaw crusher, No. 00.
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Robins double roll 24"x30" coal crusher.
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Simplex coal pulverizer with roller bearings.
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Enclosed 12"x90' chain bucket elevator.
Enclosed 16"x68' chain bucket elevator.
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18" or 20"x42' bucket elevator, 9 ply belt.
Continuous 12"x42' bucket elevator.
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Continuous 14"x50' chain bucket elevator.
Continuous 30"x35' double chain bucket elevator.
New and used elevator chain and belt.
Elevators for grain, 11", 14", 18" buckets.
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Steel belt conveyor, 23"x96'.
Jeffrey Foundry mold conveyor, 42"x150'.
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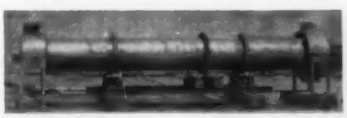

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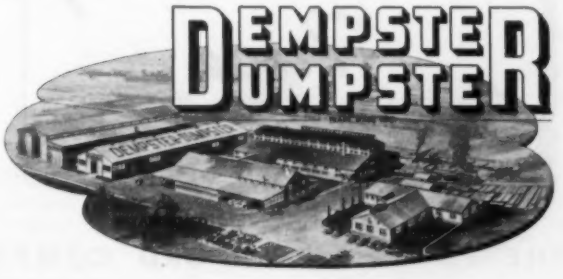

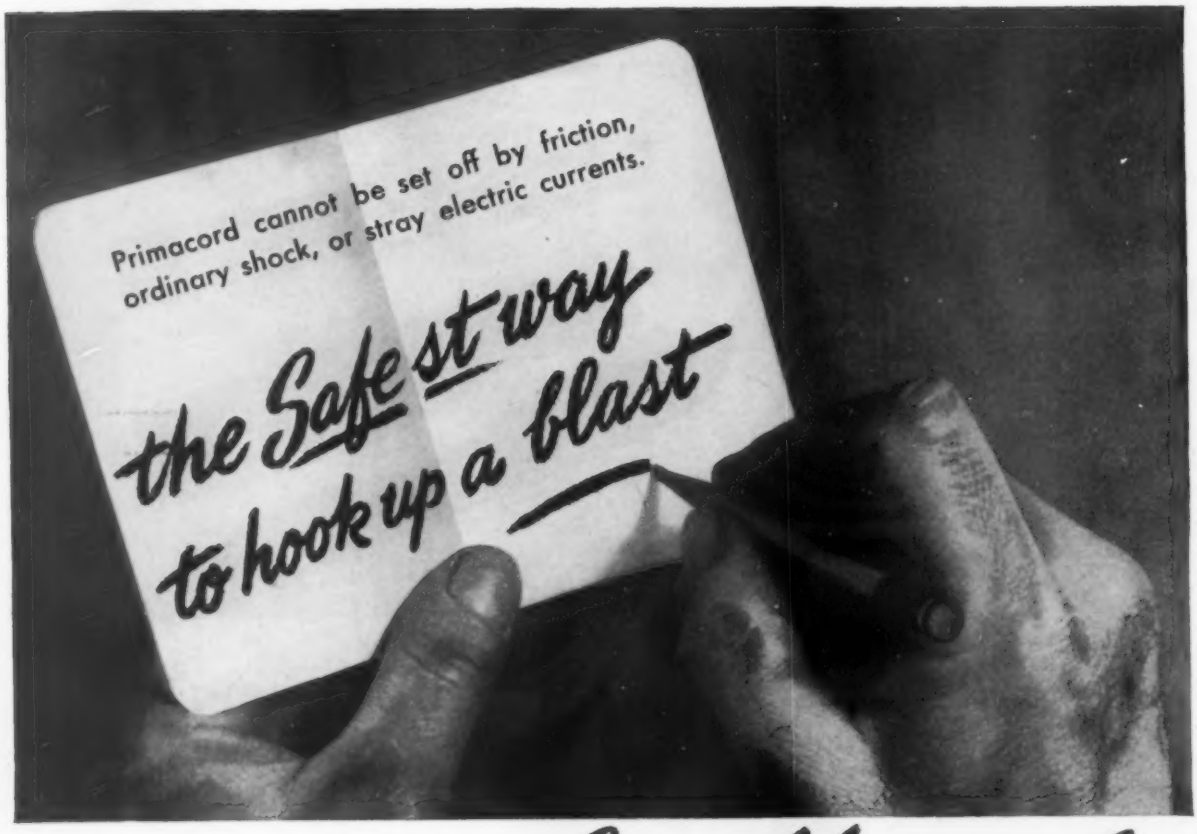

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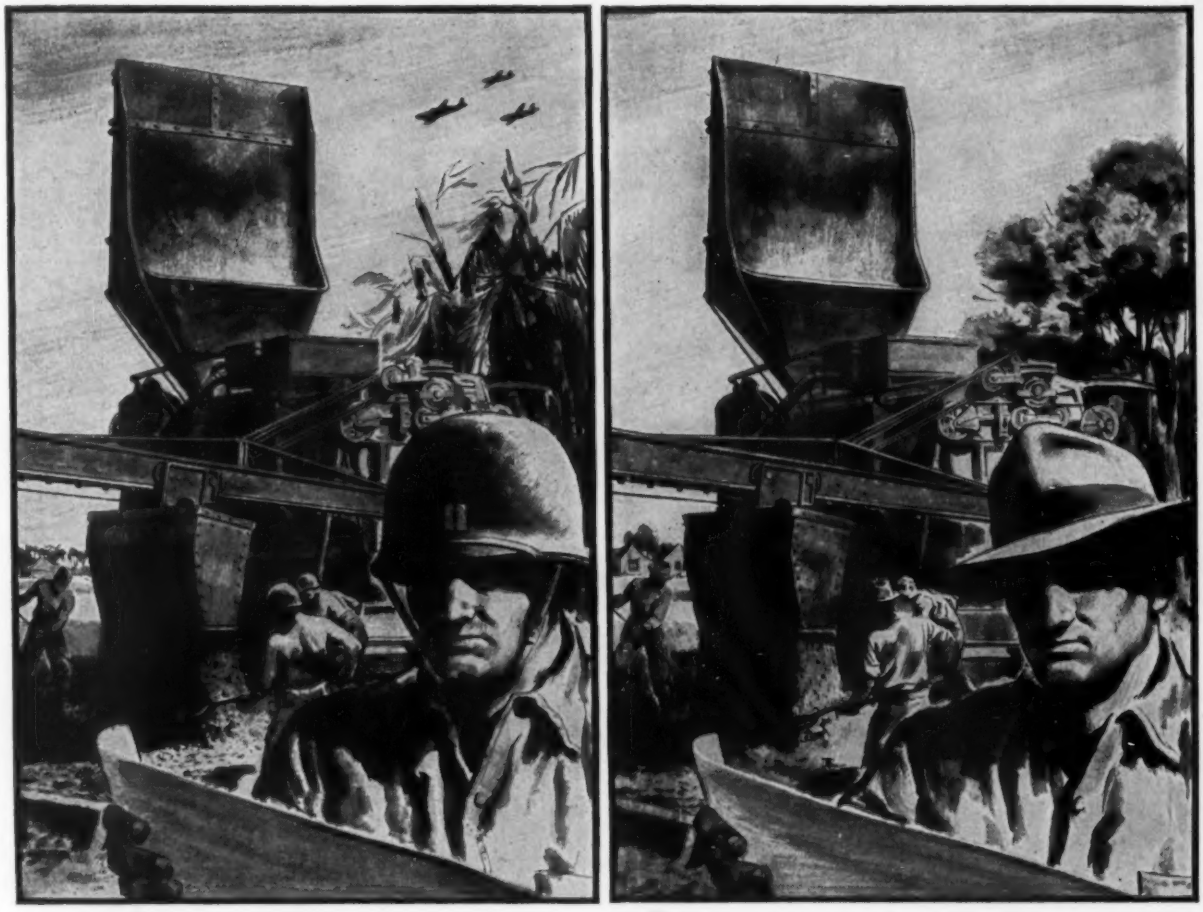

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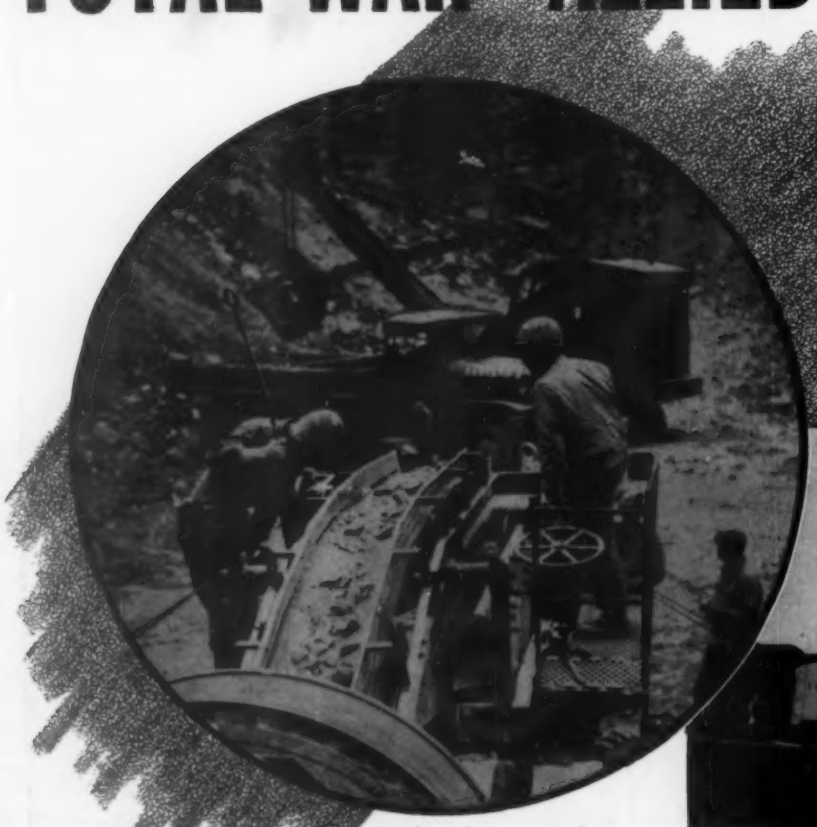

FRANCE — A [illegible]-B shovel loads rock for a crusher.
(Signal Corps Photo)

ENGLA[illegible] *(Sig[illegible] Photo)* [illegible]ations.

SICILY — [illegible] *(Sig[illegible] Corps Photo)* [illegible]g mats

SOUTHW[illegible] [illegible]upplies trucks with aggregate. *(Official Navy Photo)*

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